APPENDIX F

Devils Lake, North Dakota

Final
Integrated Planning Report
and
Environmental Impact Statement

Cost Engineering

Appendix F

Cost Engineering

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Appendix F

Cost Engineering

Scope

1. This cost engineering appendix applies only to the Pelican Lake 300 CFS Outlet Plan with constrained flows for downstream channel capacity and sulfate levels. The components of the plan are listed on the Total Project Cost Summary Sheet in this appendix and are depicted and discussed in the report.

2. Initially, only the project features directly associated with conveying Pelican Lake water to the Sheyenne River were included in the design estimate. These features, including 02 Relocations, 09 Channels and Canals (gravity pipeline, pressure pipeline and reservoir), and 13 Pumping Plant (pumps and motors, and pumping station), were designed and estimated to a feasibility level, complete with work analysis using MCACES. BARR Engineering prepared the feasibility level design and cost estimate for these project features under contract with the St. Paul District.

3. Later, it was decided that project needed to include features that account for potential adverse environmental and cultural affects of pumping water from Pelican Lake to the Sheyenne River. These additional features, including all of 06 Fish and Wildlife and all of 18 Cultural Resources together with 09 Channels and Canals (dry lake diversion and low head dams on the Sheyenne River) and 13 Pumps and Motors (sand filter), were designed and estimated to a reconnaissance level. These reconnaissance level features were designed and estimated by the St. Paul District, BARR Engineering, or Peterson Consultants. In addition, estimated costs for Real Estate were provided by the St. Paul District Real Estate Division and estimated costs for Planning, Engineering and Design and Supervision and Administration were provided by the project manager.

4. The costs for all of the project features are presented on the Total Project Cost Summary Sheet regardless of the level of design and estimate. The available backup for each line item can be found by reviewing the spreadsheets located after the Total Project Cost Summary Sheet. The spreadsheets are organized by the major account codes, separated by header sheets. Note that for the line items where a feasibility level estimate was prepared, the spreadsheets will be detailed and reasonably easy to follow. For all other items designed and estimated to a reconnaissance level, the spread sheets are not as detailed and do not have a consistent format. The amounts actually used in the Total Project Cost Estimate drawn from the reconnaissance level spreadsheets have been bolded in an attempt to make tracking the amounts easier.

5. The remaining information in the appendix write-up pertains to the items in the Total Project Cost Summary that have been designed and estimated to a feasibility level.

General

6. The estimate was developed based on the 1998 cost estimate for the same project (with some modifications) as well as review of project plans, discussion with the designers, and quotes from a variety of suppliers. The estimate was prepared using Micro-Computer Aided Cost Estimating System (MCACES Version 5.31) and is in accordance with the Civil Works Work Breakdown Structure (CWBS) as presented in the models database for MCACES through the feature level.

Price Level

7. Project costs and contingencies are priced at July 2002 price level and are based on the 1998 prices increased by an inflation factor, unless noted otherwise. Estimated costs are considered fair and reasonable to a prudent and capable contractor and include overhead, profit, and bond. Labor rates are from Davis-Bacon wage rates. Equipment rates are from EP 1110-1-8 Construction Equipment Ownership and Operating Expense Schedule.

Project Description

8. An open channel flow approximately 7.6 miles long conveys water from Pelican Lake to the north side of Minnewaukan. Most of the alignment is low enough that the actual length of excavated channel will only be about 2.5miles. The channel will have a bottom width of 25 feet and 3 to 1 side slopes. Concrete box culverts are required where the open channel crosses Highway 281 and Schneider's Crossing (gravel township road north of the pump station).

9. A separation embankment will be constructed on Highway 281 between Minnewaukan and Highway 19, if the Highway Department abandons this stretch of road and does not raise it. The embankment would have a top elevation of 1455 and would be sized to fit on top of the existing road embankment while still providing erosion protection and enough top width to construct and maintain it. Highway 19 is already at Elevation 1455. In addition to the embankment, approximately 21 existing culverts under Highways 281 and 19 would be plugged to provide more flow separation.

10. A pump station located on the northwest side of Minnewaukan receives water from the open channel and conveys water to the control reservoir south-southwest out of the pump station through the pressure pipeline segments. The pump station will contain three 100-cfs pumps. The electric motors for the pumps will be almost 4000 horsepower each in order to pump against the maximum design head of 240feet. The substructure for the pump station will be a conventional reinforced concrete wet well-type structure designed to operate for lake elevations between 1441.5 and 1463. The bottom of the wet well will be at Elevation 1426 and the top of the concrete substructure will be at Elevation 1467 in order to be higher than any potential lake elevation. Because of a very weak layer of soil near the base of the structure, it will be founded on short H-piles driven into the pier shale foundation. A combined trash rack and fish screen will be provided at the pump station intake. The screen will be a fixed type cleaned by a rake system. A metal superstructure will be provided to protect the motors, valves, and operating equipment. Roof hatches will provide maintenance access into the pump station for the removal and installation of motors and valves.

11. From the pump station, flow from each pump will be conveyed in three 48-inch-diameter ductile iron pipes (DIPs). Like all pipeline on this project, they will be buried to frost depth. Compressed air surge tanks will be located at the beginning of these pipes to protect the pump station in case of sudden shutdown. The ductile iron pipes will run approximately 3.5 miles to the south-southwest where they will connect to a concrete transition structure.

12. A single 84-inch reinforced concrete pressure pipe (RCPP) extends approximately 4.5 miles south-southwest, conveying water from the concrete transition structure at the end of the DIP to a sand filter and a control reservoir at the watershed divide between the Devils Lake basin and the Sheyenne River basin. The sand filter is noted here but has not been designed or estimated to a feasibility level of design.

13. A control reservoir is located at the high point along the outlet route, providing a transition from pressure to gravity pipeline flows, and providing a point where flow rate to the Sheyenne River is controlled. The reservoir has been sized to attenuate the flow surges produced by the alternately

running pumps into a relatively smooth flow output. To minimize the number of starts required for the very large pumps and motors, the reservoir will require an area of about 40acres. It will be contained by earth side berms that make the total area required for it about 60acres.

14. Approximately 6.7 miles of RCPP extend from the reservoir, conveying water to the Sheyenne River. The route generally follows the alignment of Peterson Coulee. The pipe varies in diameter from 84inches in diameter on the flat upper reaches of the alignment to 66inches in diameter in the steeper reaches along the bottom of Peterson Coulee. At the end of this pipe, flow will discharge into a 90-foot-long steel plate arch structure that will provide for expansion and slowing of the water as it enters the river.

15. Gaging stations will be constructed upstream and downstream of the discharge point on the Sheyenne River in order to provide the monitoring needed to control flow discharges.

Contingency Discussion

16. After review of the project documents and discussion with the designers, contingencies were developed which reflect the uncertainties associated with each item. These contingencies are based on uncertainties in quantities, unit pricing, and items of work not defined or recognized at the time of design. The levels of uncertainty for the estimate will generally be as follows:

    - For unit pricing: 10 percent.
    - For quantities and unanticipated items of work: 5 to 20 percent.

    A. Open Channel. The accuracy of the earthwork quantities for the open channel is based on the mapping data available. Based on the level of detail of this mapping, a contingency of 20% was assumed for the open channel earthwork quantities. All other items, except the road raise, were well defined, therefore a contingency of 5% was assumed for quantities and unanticipated items of work. The road raise design was not developed to a detailed level and therefore a 20% contingency was assumed to account for quantities and unanticipated items of work. A 10% contingency was assumed for all unit pricing.

    B. Pump Station. The pump station, including the concrete substructure, was very well defined and therefore a contingency of 10%-20% was assumed for quantities and unanticipated items of work. The unit pricing for the large components of the pump station (pumps, motors, and valves) came directly from vendors. A contingency of 10% was assumed for all unit costs.

    C. Pipeline. The pipeline quantities, particularly the earthwork quantities, are dependent on the mapping information available. For Stations 0+00 to 315+00, detailed mapping was available and therefore a 10% contingency was assumed for the pipeline earthwork. For stations beyond that, the mapping information was not as detailed, therefore a 20% contingency was assumed for quantities. For the actual pipeline installation, a contingency of 10% was assumed for quantity, since the alignment is very well defined. A contingency of 10% for quantities was assumed for all concrete structures (manholes, etc.) and road crossings. A 10% contingency was assumed for all unit pricing.

Construction Methods

17. The construction of the open channel excavation was assumed to occur in two conditions: dry conditions (with some minimal pumping) and wet conditions. For the dry excavation, the construction method consists of a large backhoe inside the excavation excavating and loading dump trucks (also

inside excavation). It was assumed that a ramp to allow access into the excavation will be constructed periodically throughout the excavation and the backhoe will load directly into the trucks. A subgrade material placed at the bottom of the excavation is also included in the estimate for constructibility reasons. A 2.5-mile haul distance was assumed for the trucks. A dozer at the dumpsite is also included in the earthwork estimate to move the stockpiled material. For the wet excavation, it was assumed that a crane with clamshell bucket would excavate the material and place it on a barge. Once full, the barge would be towed upstream with a small tugboat to a designated disposal area. A backhoe would be onsite at the disposal area to unload the barge. It was assumed that two barges would be used for this work.

18. The pump station is a standard heavy civil works type construction that includes excavation, fill, structural concrete, piping, pumps and motors, and pump station building and associated HVAC, and electrical items. Standard industry practices were used for all work items.

19. The pipeline excavation consists of a large backhoe inside the excavation stockpiling on one side. The excavated material will remain in place and be used as backfill for the pipeline. Productivity rates for the excavation, pipeline installation, backfill, and compaction were based on the CAT Handbook, Means, and discussions with experienced Contractors. Two separate crews were assumed for backfill and compaction below and around the pipe and above the pipe.

MCACES Cost Estimate

20. Both a hard copy and an electronic copy of the detailed MCACES estimate are available for review. To reduce reproduction requirements, a copy of the detailed MCACES estimate is not included in this appendix.

Operation and Maintenance Estimate

21. A detailed operation and maintenance cost estimate for this project has been prepared. The O&M estimate is based on recommendations from designers, vendors, and assumed repair and maintenance schedules. O&M costs are included only for the operation and maintenance of the features directly related to pumping water from Pelican Lake to the Sheyenne River except for the sand filter. The O&M estimate is included at the end of this appendix.

Total Project Cost Summary

Devils Lake Outlet
Total Project Cost Summary Sheet

Date: February 12, 2003

WBS	Description	Total Estimated Amount	Contingencies		Amount Plus Contingencies	Index Factor To 10/02	Indexed Cost To 10/02	Mid-Point of Feature	Index To Mid-Point Factor	Fully Funded Amount	Fully Funded Contingency	Fully Funded Amount Plus Contingency
			%	Amount								
01	Lands and Damages	**$8,435,000**	26%	**$2,181,000**	**$10,616,000**		**$10,688,000**			**$9,273,000**	**$2,393,000**	**$11,666,000**
	Outlet	$729,675	35%	$255,325	$985,000	0.00675	$992,000	Jun-04	0.048	$770,000	$269,000	$1,039,000
	Dry Lake Diversion	$1,997,000	25%	$497,000	$2,494,000	0.00675	$2,511,000	Jun-05	0.076	$2,163,000	$538,000	$2,701,000
	D.S Flowage Easements	$3,047,970	25%	$762,030	$3,810,000	0.00675	$3,836,000	Jun-05	0.076	$3,302,000	$825,000	$4,127,000
	Low Head Dams on Sheyenne River	$30,783	30%	$9,217	$40,000	0.00675	$40,000	Jun-05	0.076	$33,000	$10,000	$43,000
	Real Estate Mitigation	$2,629,755	25%	$657,245	$3,287,000	0.00675	$3,309,000	Jun-07	0.135	$3,005,000	$751,000	$3,756,000
02	Relocations	**$992,000**	17%	**$164,000**	**$1,156,000**	0.00675	**$1,164,000**	Feb-06	0.095	**$1,094,000**	**$181,000**	**$1,275,000**
06	Fish and Wildlife	**$25,446,000**	28%	**$7,120,000**	**$32,563,000**		**$32,783,000**			**$30,429,000**	**$8,551,000**	**$38,980,000**
	Environmental Mitigation Outlet	$72,000	30%	$22,000	$94,000	0.00675	$95,000	Jun-06	0.105	$80,000	$24,000	$104,000
	Environmental Mitigation Dry lake	$781,000	30%	$234,000	$1,015,000	0.00675	$1,022,000	Jun-07	0.135	$892,000	$267,000	$1,159,000
	Environmental Mitigation Downstream											
	Terrestrial	$3,039,000	30%	$912,000	$3,951,000	0.00675	$3,978,000	Jun-07	0.135	$3,473,000	$1,042,000	$4,515,000
	Cutoffs/Meanders	$7,000,000	29%	$2,000,000	$9,000,000	0.00675	$9,061,000	Jun-07	0.135	$7,999,000	$2,285,000	$10,284,000
	Erosion Protection	$6,662,000	30%	$1,999,000	$8,660,000	0.00675	$8,718,000	Jun-07	0.135	$7,612,000	$2,284,000	$9,896,000
	Monitoring											
	Water Quality	$557,000	15%	$84,000	$640,000	0.00675	$644,000	Jun-06	0.105	$620,000	$93,000	$713,000
	Groundwater/Salinity	$472,000	15%	$71,000	$543,000	0.00675	$547,000	Jun-06	0.105	$525,000	$79,000	$604,000
	Erosion/Sediment	$264,000	15%	$40,000	$304,000	0.00675	$306,000	Jun-06	0.105	$294,000	$44,000	$338,000
	Aquatic Habitat	$290,000	15%	$44,000	$333,000	0.00675	$335,000	Jun-06	0.105	$323,000	$49,000	$372,000
	Aquatic/Invasive Species	$871,000	15%	$131,000	$1,002,000	0.00675	$1,009,000	Jun-06	0.105	$969,000	$146,000	$1,115,000
	Riparian Habitat	$321,000	15%	$48,000	$369,000	0.00675	$371,000	Jun-06	0.105	$357,000	$53,000	$410,000
	Adaptive Management Costs											
	Environmental Mitigation	$2,308,000	30%	$692,000	$3,000,000	0.00675	$3,020,000	Jun-14	0.414	$3,286,000	$985,000	$4,271,000
	Monitoring	$2,809,000	30%	$843,000	$3,652,000	0.00675	$3,677,000	Jun-14	0.414	$3,999,000	$1,200,000	$5,199,000
09	Channels & Canals	**$45,185,000**	23%	**$10,306,000**	**$55,491,000**		**$55,865,000**			**$49,076,000**	**$11,221,000**	**$60,297,000**
	Gravity Pipeline	$11,796,000	20%	$2,362,000	$14,158,000	0.00675	$14,254,000	Jun-05	0.076	$12,778,000	$2,559,000	$15,337,000
	Pressure Pipeline and reservoir	$25,131,000	21%	$5,154,000	$30,285,000	0.00675	$30,489,000	Jun-05	0.076	$27,223,000	$5,583,000	$32,806,000
	Inlet Channel	$5,086,000	29%	$1,474,000	$6,560,000	0.00675	$6,604,000	Jun-05	0.076	$5,509,000	$1,597,000	$7,106,000
	Dry Lake Diversion	$1,962,000	36%	$711,000	$2,673,000	0.00675	$2,691,000	Jun-06	0.105	$2,183,000	$791,000	$2,974,000
	Low Head Dams on Sheyenne River	$1,210,000	50%	$605,000	$1,815,000	0.00675	$1,827,000	Jun-07	0.135	$1,383,000	$691,000	$2,074,000
13	Pumping Plant	**$26,390,000**	33%	**$8,676,000**	**$35,066,000**		**$35,302,000**			**$28,561,000**	**$9,393,000**	**$37,954,000**
	Pumps and Motors	$2,962,000	20%	$592,000	$3,554,000	0.00675	$3,578,000	Feb-05	0.067	$3,182,000	$636,000	$3,818,000
	Pump Station	$10,722,000	22%	$2,366,000	$13,088,000	0.00675	$13,176,000	Jun-05	0.076	$11,615,000	$2,563,000	$14,178,000
	Sand Filter	$12,706,000	45%	$5,718,000	$18,424,000	0.00675	$18,548,000	Jun-05	0.076	$13,764,000	$6,194,000	$19,958,000
18	Cultural Resources Preservation	**$9,451,000**	50%	**$4,712,000**	**$14,162,000**		**$14,257,000**			**$10,864,000**	**$5,403,000**	**$16,267,000**
	Within 1% of Federal Costs	$778,000	57%	$442,000	$1,220,000	0.00675	$1,228,000	Jun-07	0.135	$889,000	$505,000	$1,394,000
	Over 1% of Federal costs	$6,240,000	57%	$3,540,000	$9,780,000	0.00675	$9,846,000	Jun-07	0.135	$7,130,000	$4,045,000	$11,175,000
	Dry Lake Diversion Surveys	$2,205,000	30%	$662,000	$2,866,000	0.00675	$2,885,000	Jun-07	0.135	$2,520,000	$756,000	$3,276,000
	Adaptive Management Costs											
	Monitoring	$228,000	30%	$68,000	$296,000	0.00675	$298,000	Jun-14	0.414	$325,000	$97,000	$422,000
30	Planning, Engineering, and Design	**$24,715,000**	18%	**$4,533,000**	**$29,248,000**		**$29,485,000**			**$26,617,000**	**$15,431,000**	**$31,748,000**
	General Investigations (PED) Sunk Costs	$10,300,000	0%	$0	$10,300,000	0.0000	$10,300,000			$10,300,000	$10,300,000	$10,300,000
	Construction General Funding	$14,415,000	31%	$4,533,000	$18,948,000	0.0125	$19,185,000	Aug-04	0.118	$16,317,000	$5,131,000	$21,448,000
31	Supervision & Administration (7%)	**$6,479,000**	27%	**$1,758,000**	**$8,237,000**	0.0125	**$8,340,000**	Jun-06	0.2040	**$7,898,000**	**$2,143,000**	**$10,041,000**
	Estimated Project Cost	**$147,093,000**	27%	**$39,450,000**	**$186,539,000**		**$187,884,000**			**$163,812,000**	**$54,716,000**	**$208,228,000**

NOTES

1 Pricing Date: July 2002

01 LANDS AND DAMAGES
DEVILS LAKE OUTLET
REAL ESTATE

	Federal	Non Federal	Total
Lands and Damages	0	4,016,575	4,016,575
Contingencies		905,425	905,425
Sub Total		4,922,000	4,922,000
RE Admin Costs	881,028	3,537,580	4,418,608
Contingencies	226,972	1,048,420	1,275,392
SubTotal	1,108,000	4,586,000	5,694,000
Grand Total	1,108,000	9,508,000	**10,616,000**

Estimated Amount	Estimated Contingencies	Percent Contingencies	Total
8,435,183	2,180,817	25.85%	10,616,000

COST SUMMARY 19-Dec-02

PROJECT: Devils Lake Outlet

TRACTS: 409

01	Lands and Damages	Fed Days/No.	Total Federal	Local Cost / Tract	Total Local
20.03.	Project Design Memorandum				
01.	Real Estate Supplement/Plan (10-Average)				
.02.	Gross Report/Appraisal (10-Average)				
03.	Preliminary RE Drawings (5-average)				
04.	Physical Takings Analysis Reports (5-average)				
05.	Attorney's Opinion of Compensability (10)				
06.	Rights of Entry (10-average)				
07.	Other (Meetings, Reviews) (30-average)				
	Contingency (25%)				
	Total				
21.03.	Feature Design Memorandum (Specific Feature)				
01.	Real Estate Supplement/Plan				
.02.	Gross Report/Appraisal				
03.	Preliminary RE Drawings				
04.	Physical Takings Analysis Reports (Estates)				
05.	Attorney's Opinion of Compensability				
06.	Rights of Entry				
07.	Other (Meetings, Reviews)				
	Contingency (25%)				
	Total				
23.03.	Construction Contract (Plans & Specs)				
01.	RE Planning (.25xTracts--$200/Tr)	102	$61,200	$200	$81,800
02.	RE Acquisition (.5xTracts--$1100/Tr)	205	$123,000	$1,100	$225,500
03.	RE Condemnation(.5xTractsx3-- $10,000/Cond)	224	$246,400	$10,000	$2,249,500
04.	RE Inleasing				
05.	RE Appraisal (.5xTracts--$500/Tr)	205	$123,000	$500	$270,600
06.	RE 91-646 Relocations (.5/relos-- $1100/relo)			$1,100	
07.	Rights of Entry/Temporary Permits		$2,200		$31,500
08.	Tribal Liaison		$18,000		$34,000
09.	RE Encroachment/Trespass				
10.	RE Disposal				
11.	RE Real Property				
12.	RE Project-Related Administrative		$172,000		$358,000
13.	RE Facility/Utility Relocation				
14.	RE Withdrawal (Public Domain)				
15.	RE Land Payments (Gross estimate/appraisal)				4,016,575.00
15.	RE 91-646 Relocation Payments (owner - $27,000) (tenant - 7,000)				
16.	RE Receipt (1 day/stage--$500/Stage)	5	$2,500	$500	$2,500
17.	RE LERRD Crediting (.5xTracts--$500/Tr)	205	$123,000	$500	$204,500
18.	RE All Other		$10,000		$80,000
	Contingency		$226,972		$1,953,845
	Total	946	$1,108,000		$9,508,000
	TOTAL	946.00	**$10,616,000**		

Federal cost per day $600

Devils Lake Outlet
Construction Cost Estimate Summary

Date: 2/26/03 1:44 PM
Prepared By: Carrie Ryan, Barr Engineering Co.
File Name: O:\users\GRS\PROJECTS\DEVILOUT\0 11 IPR EST\[Total Est 030203.xls]Summary
Pricing Date: Jul-02

02 RELOCATIONS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
200	**Relocations**				**$991,565**	**17%**	**$164,226**		**$1,155,791**
200200	**Civil Site Layout**				**$309,828**	**20%**	**$61,966**		**$371,793**
200200050	City Well Relocation	LS	1	$309,827.60	$309,828	20%	$61,966	1,2,4	$371,793
100300	**Road Crossings**				**$548,797**	**15%**	**$82,320**		**$631,117**
100300100	Sta 1034+90 - Hwy 281								
100300100100	Sawcut Bituminous Road	LF	72	$1.83	$132	15%	$20	1,4	$152
100300100200	Remove Bituminous Roadway	SF	240	$2.62	$628	15%	$94	1,4	$723
100300100300	Traffic Control	LS	1	$4,132.08	$4,132	15%	$620	1,4	$4,752
100300100400	Excavation	CY	3,272	$1.50	$4,910	15%	$736	1,2,4	$5,646
100300100500	Dewatering (300 gpm)	LS	1	$3,609.77	$3,610	15%	$541	1,2,4	$4,151
100300100600	Pipe Bedding	CY	200	$22.59	$4,519	15%	$678	1,4	$5,196
100300100650	Box Culvert	LF	171	$1,180.32	$201,835	15%	$30,275	1,3,4	$232,110
100300100700	Flared End Sections	EA	2	$12,381.73	$24,763	15%	$3,715	1,3,4	$28,478
100300100750	Backfill - Placement	CY	1,672	$1.66	$2,776	15%	$416	1,4	$3,192
100300100775	Backfill - Compact	CY	1,672	$1.01	$1,691	15%	$254	1,4	$1,945
100300100800	Riprap	CY	267	$48.42	$12,927	15%	$1,939	1,4	$14,866
100300100850	Filter Material	CY	135	$29.72	$4,012	15%	$602	1,4	$4,614
100300100900	Road Restoration	LS	1	$5,059.08	$5,059	15%	$759	1,4	$5,818
100300200	Sta 866+00								
100300200300	Traffic Control	LS	1	$2,023.21	$2,023	15%	$303	1,4	$2,327
100300200400	Excavation	CY	3,712	$1.50	$5,570	15%	$836	1,2,4	$6,406
100300200500	Dewatering (120 gpm)	LS	1	$2,823.52	$2,824	15%	$424	1,2,4	$3,247
100300200600	Pipe Bedding	CY	200	$22.59	$4,519	15%	$678	1,4	$5,196
100300200650	Box Culvert	LF	196	$1,180.32	$231,343	15%	$34,701	1,3,4	$266,045
100300200700	Flared End Sections	EA	2	$12,381.73	$24,763	15%	$3,715	1,3,4	$28,478
100300200750	Backfill - Placement	CY	1,611	$1.66	$2,674	15%	$401	1,4	$3,076
100300200775	Backfill - Compact	CY	1,611	$0.81	$1,299	15%	$195	1,4	$1,494
100300200800	Road Replacement (Class V)	CY	55	$50.68	$2,788	15%	$418	1,4	$3,206

Devils Lake Outlet
Construction Cost Estimate Summary

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02 RELOCATIONS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
100400	**Culvert Plugging**				**$132,940**	**15%**	**$19,941**		**$152,881**
100400100	Large Diameter (72")	EA	8	$14,206.29	$113,650	15%	$17,048	2,4	$130,698
100400200	Small Diameter (36")	EA	12	$1,607.48	$19,290	15%	$2,893	2,4	$22,183

Reason for Contingencies: Uncertainties in:	
1	Quantities
2	Site Conditions
3	Haul Distances
4	Unit Pricing

Table 5
Dry Lake Diversion
Project Cost Estimate Summary

Estimated Construction Cost (Includes Contingencies)	**$2,673,700**
Engineering and Design (25% of Construction Cost)	$668,400
Construction Engineering, Supervision, and Admin. (7.5% of Construction Cost)	$200,500
Environmental Mitigation [a]	**$1,015,100**
Cultural Resources Survey [b]	**$2,866,000**
Real Estate [c]	$2,494,000
Total Estimated First Costs	**$9,917,700**

Annual Cost of Estimated Total First Costs	$662,400
Term: 50 years	
Interest Rate: 6.375%	
Annual Operation and Maintenance Cost	$32,500

Total Est. Annual Cost	**$694,900**

[a] Includes $1,000,000 for Lake Alice National Wildlife Refuge compatibility compliance. Costs provided by St. Paul District Corps of Engineers.

[b] Costs are for surveys only. Does not include possible future costs for cultural resources site evaluation and mitigation. Costs provided by St. Paul District Corps of Engineers.

[c] Includes all real estate costs. Includes administration costs for acquisition. Costs provided by St. Paul District Corps of Engineers.

DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT	CONTINGENCY %	CONTINGENCY AMOUNT	TOTAL			
Control Structure on Meander										
Excavation	484	CY	6.00	2,904	30%	871	3,775			
Earth Fill	627	CY	5.00	3,135	30%	941	4,076			
Riprap	774	CY	51.00	39,474	30%	11,842	51,316			
Bedding	387	CY	50.00	19,350	30%	5,805	25,155			
RCP, 48" Dia Pipe	132	LF	125	16,500	30%	4,950	21,450			
RCP, 48" Dia End Sections	4	EA	1,600	6,400	30%	1,920	8,320			
Total Control Structure on Meander							114,000			
Control Structure on Cutoff Channel										
Excavation	386	CY	6.00	2,316	30%	695	3,011			
Earth Fill	661	CY	5.00	3,305	30%	992	4,297			
Riprap	776	CY	51.00	39,576	30%	11,873	51,449			
Bedding	388	CY	50.00	19,400	30%	5,820	25,220			
RCP, 48" Dia Pipe	564	LF	125	70,500	30%	21,150	91,650			
RCP, 48" Dia End Sections	12	EA	1,600	19,200	30%	5,760	24,960			
Total Control Structure on Cutoff Channel							201,000			
Riprap at Downstream End of Each Cutoff Channel										
Excavation	1,769	CY	6.00	10,614	30%	3,184	13,798			
Riprap	943	CY	51.00	48,093	30%	14,428	62,521			
Bedding	472	CY	50.00	23,600	30%	7,080	30,680			
Total Riprap at Downstream End of Each Cutoff Channel							107,000			
Mob, Site Prep, Dewatering 20.00%				65,000	30%	19,500	84,500			
Total Estimated Construction Cost				389,000		117,000	506,000			
9 Sites								3,501,000	1,053,000	4,554,000
										4,554,000
Lands										
Control Structure Sites, Acres per Site	5.0	AC/Site	500	2,500	30%	750	3,250			
Environmental Mitigation							0			
Cultural Mitigation							0			
Planning, Engineering and Design 27.00%							137,000			
Supervision and Administration 7.00%							35,000			
Total Estimated Amount Per Site							**681,000**			
Cutoff Channel										
Excavation per Foot of Channel, (incl dewatering)	28	CY/LF	4.00	112.00	30%	33.60	145.60			
25651 LF								2,872,912	861,874	3,734,786
										3,734,786
								6,373,912	1,914,874	8,288,786
TOTAL ESTIMATED CONSTRUCTION COST							**ROUNDED**	**7,000,000**	**2,000,000**	**9,000,000**
Lands										
Channel Lands, Acres per Foot	0.0048	AC/FT	500	2.40	30%	0.72	3.12			
Environmental Mitigation							0			
Cultural Mitigation $100,000 per mile	1	FT	18.94	18.94	30%	5.68	24.62			
Planning, Engineering and Design 27.00%	1	FT					39.31			
Supervision and Administration 7.00%	1	FT					10.19			
Total Estimated Amount Per Foot							**223.00**			

NOTES
1 Unit prices based on estimate prepared for the Sheyenne Dams estimate

Recommended 10 Years
Constrained Outlet
Monitoring and Mitigation Proposal
Estimated Costs Summary

Resource Area	Activity	First Costs	O and M (avg/yr)	Year 1 1.000	Year 2 0.942	Year 3 0.888	Year 4 0.837	Year 5 0.788	Year 6 0.743	Year 7 0.700	Year 8 0.660	Year 9 0.622	Year 10 0.586	Year 11 0.552	Year 12 0.520	Year 13 0.490	Year 14 0.462
Pelican Lake Outlet																	
CR Phase I Survey		$ 60,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TES Survey			$ -														
Mitigation		**$ 94,000**															
Dry Lake Diversion																	
CR Survey		$ 2,900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TES Survey			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Mitigation		**$ 1,015,000**	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Water Quality		**$ 640,353**	**<<<Total Water Quality Monitoring**									**$ 93,238**	**<<<Monitoring Adaptive Management Cost**				
Monitoring	Surface Water Quality	$ 237,000	$ 110,000	$ 110,000	$ 103,651	$ 97,669	$ 92,032	$ 86,721	$ 81,715	$ 76,999	$ 72,555	$ 68,368	$ 64,422	$ 60,704	$ 57,200	$ 53,899	$ 50,788
	Mercury	$ -	$ 40,000	$ 40,000	$ 37,691	$ 35,516	$ 33,466	$ 31,535	$ 29,715	$ 28,000	$ 26,384	$ 24,861	$ 23,426	$ 22,074	$ 20,800	$ 19,600	$ 18,468
Mitigation	Surface Water Quality	N/A - None Proposed Beyond Erosion Control and Acreage Proposal					$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Mercury	N/A - None Presently Proposed				$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Groundwater and Soil Salinity		**$ 543,016**	**<<<Total Groundwater/ Salinity Monitoring**									**$ 55,937**	**<<<Monitoring Adaptive Management Cost**				
Monitoring	Groundwater	$ 56,000	$ 37,000	$ 37,000	$ 34,865	$ 32,852	$ 30,956	$ 29,170	$ 27,486	$ 25,900	$ 24,405	$ 22,996	$ 21,669	$ 20,419	$ 19,240	$ 18,130	$ 17,083
	Alluvial Transects	$ 101,000	$ 30,000	$ 30,000	$ 28,269	$ 26,637	$ 25,100	$ 23,651	$ 22,286	$ 21,000	$ 19,788	$ 18,646	$ 17,570	$ 16,556	$ 15,600	$ 14,700	$ 13,851
	Alluvial Crops	$ 10,000	$ 14,000	$ 14,000	$ 13,192	$ 12,431	$ 11,713	$ 11,037	$ 10,400	$ 9,800	$ 9,234	$ 8,701	$ 8,199	$ 7,726	$ 7,280	$ 6,860	$ 6,464
	Irrigated Soils	$ 46,000	$ 9,000	$ 9,000	$ 8,481	$ 7,991	$ 7,530	$ 7,095	$ 6,686	$ 6,300	$ 5,936	$ 5,594	$ 5,271	$ 4,967	$ 4,680	$ 4,410	$ 4,155
Mitigation		N/A - None Presently Proposed															
Erosion and Sedimentation		**$ 8,660,000**	**<<<Tot Eros & Sed**	**$ 304,348**	**<<< Total Erosion/Sediment Monitoring**							**$ 25,793**	**<<<Monitoring Adaptive Management Cost**				
Monitoring	Erosion Surveys	$ -	$ 83,000	$ 83,000	$ 78,210	$ 73,696	$ 69,442	$ 65,435		$ 58,099		$ 51,587		$ 45,804		$ 40,669	
	Sedimentation Monitoring	(No costs: included in Surface Water Quality monitoring)															
Mitigation	Bank Stabilization Upstream	$ 2,800,000		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Design	$ 840,000															
	Bank Stabilization Downstream	$ 5,510,000		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Design	$ 1,653,000															
	Buffer Restoration	$ 350,000	$ 24,000	$ 24,000	$ 22,615	$ 21,310	$ 20,080	$ 18,921									
Aquatic Habitat				**$ 333,342**	**<<<(Includes additional $150,000 for acquatic habitat survey)**							**$ 31,076**	**<<<Monitoring Adaptive Management Cost**				
Monitoring		$ -	$ 50,000	$ 50,000	$ 47,114	$ 44,395	$ 41,833	$ 39,418	$ 37,143	$ 35,000	$ 32,980	$ 31,076	$ 29,283	$ 27,593	$ 26,000	$ 24,500	$ 23,086
Mitigation		N/A - None Proposed Beyond Erosion Control and Acreage Proposal															
Aquatic and Wetland Species Composition				**$ 1,001,703**	**<<<(Includes additional $250,000 for acquatic plant survey)**							**$ 127,413**	**<<<Monitoring Adaptive Management Cost**				
Monitoring	Invertebrates	$ -	$ 50,000	$ 50,000	$ 47,114	$ 44,395	$ 41,833	$ 39,418	$ 37,143	$ 35,000	$ 32,980	$ 31,076	$ 29,283	$ 27,593	$ 26,000	$ 24,500	$ 23,086
	Fishes	$ -	$ 50,000	$ 50,000	$ 47,114	$ 44,395	$ 41,833	$ 39,418	$ 37,143	$ 35,000	$ 32,980	$ 31,076	$ 29,283	$ 27,593	$ 26,000	$ 24,500	$ 23,086
	Mussels	$ -	$ 25,000	$ 25,000	$ 23,557	$ 22,198	$ 20,916	$ 19,709	$ 18,572	$ 17,500	$ 16,490	$ 15,538	$ 14,641	$ 13,796	$ 13,000	$ 12,250	$ 11,543
	Macrophytes	$ -	$ 25,000	$ 25,000	$ 23,557	$ 22,198	$ 20,916	$ 19,709	$ 18,572	$ 17,500	$ 16,490	$ 15,538	$ 14,641	$ 13,796	$ 13,000	$ 12,250	$ 11,543
	Algae	$ -	$ 15,000	$ 15,000	$ 14,134	$ 13,319	$ 12,550	$ 11,826	$ 11,143	$ 10,500	$ 9,894	$ 9,323	$ 8,785	$ 8,278	$ 7,800	$ 7,350	$ 6,926
	Biota Transfer		$ 40,000	$ 40,000	$ 37,691	$ 35,516	$ 33,466	$ 31,535	$ 29,715	$ 28,000	$ 26,384	$ 24,861	$ 23,426	$ 22,074	$ 20,800	$ 19,600	$ 18,468
Mitigation	(sand filter)			$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Riparian Habitat and Delta Vegetation		**$ 369,009**	**<<< Total Riparian Habitat Monitoring**									**$ 31,698**	**<<<Monitoring Adaptive Management Cost**				
Monitoring	Transects	$ 182,000	$ 51,000	$ 51,000	$ 48,057	$ 45,283	$ 42,669	$ 40,207	$ 37,886	$ 35,700	$ 33,639	$ 31,698	$ 29,868	$ 28,144	$ 26,520	$ 24,990	$ 23,547
Mitigation	Acreage	$ 4,271,000	$ 6,000	$ 6,000	$ 5,654	$ 5,327	$ 5,020	$ 4,730	$ 4,457	$ 4,200	$ 3,958	$ 3,729	$ 3,514	$ 3,311	$ 3,120	$ 2,940	$ 2,770
Cultural Resources																	
Evaluation	Phase I Survey		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Phase II Evaluation		$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Monitoring	Phase II Class 3 and Mit. Class 3	$ -	$ 69,000	$ 69,000	$ 65,018	$ 61,265	$ 57,729	$ 54,397	$ 51,258	$ 48,300	$ 45,512	$ 42,885	$ 40,410	$ 38,078	$ 35,880	$ 33,809	$ 31,858
Mitigation	Priority Classes 1 and 2	$ 10,000,000	$ 800,000	$ 800,000	$ 753,828	$ 710,321	$ 669,325	$ 630,695	$ 594,294	$ 559,995	$ 527,674	$ 497,220	$ 468,523	$ 441,482	$ 416,002	$ 391,992	$ 369,368
	Design for 53 site protection	$ 3,000,000															
Surface Water Users																	
Monitoring		N/A - None Presently Proposed															
Mitigation		$ -	$ 40,000	$ 40,000	$ 37,691	$ 35,516	$ 33,466	$ 31,535	$ 29,715	$ 28,000	$ 26,384	$ 24,861	$ 23,426	$ 22,074	$ 20,800	$ 19,600	$ 18,468
Valley City Fish Hatchery																	
Monitoring	Water Quality	N/A - Included under Water Quality Monitoring															
	Hatchery Infrastructure	N/A - Would be carried out by Hatchery Staff															
Mitigation	Lake Ashtabula Storage Control	N/A - Would be carried out by Bald Hill Dam opertor(s)															

NOTE: INCLUDES FIRST 14 YEARS AS A FIRST COST WITH 15 THROUGH 50 AS REMAINING O AND M

Current Estimate (12/02)
Adaptive Management Costs

	Annual Amount	No. Of Years		Total	Notes
Environmental Mitigation Downstream					
Terrestrial	$ 50,000	10	$	500,000.00	2
Cutoffs/Meanders	$ 50,000	10	$	500,000.00	2
Erosion Protection	$ 200,000	10	$	2,000,000.00	2
Total Environmental Mitigation Downstream			**$**	**3,000,000.00**	2
Monitoring					
Water Quality	$ 93,238	10	$	932,377.01	1, 2
Groundwater/Salinity	$ 55,937	10	$	559,372.21	1, 2
Erosion/Sediment	$ 25,793	10	$	257,932.74	1, 2
Aquatic Habitat	$ 31,076	10	$	310,762.34	1, 2
Aquatic/Invasive Species	$ 127,413	10	$	1,274,125.58	1, 2
Riparian Habitat	$ 31,698	10	$	316,977.58	1, 2
Monitoring			**$**	**3,652,000.00**	

Notes

1 Total amount based on present value of year 9 amount multiplied times 10 years.

2 All costs include 30% contingencies.

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09 CHANNELS AND CANALS						Contingencies			Estimated
Reference No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**	**Percent**	**Amount**	**Reason**	**Total Cost**
	CHANNELS AND CANALS				$42,012,392		$8,989,543		$51,001,935
100	**Open Channel**				**$5,085,662**	**29%**	**$1,473,580**		**$6,559,242**
100100	**Mobilization/Demobilization**				**$347,460**	**15%**	**$52,119**		**$399,579**
100100100	Mobilization								
100100100100	Equipment	HR	80	$1,684.03	$134,723	15%	$20,208	3	$154,931
100100100200	Transportation of Equipment	HR	480	$75.71	$36,341	15%	$5,451	3	$41,792
100100100300	Setup of Equipment	HR	80	$33.33	$2,666	15%	$400	3	$3,066
100100200	Demobilization			$173,729.95					
100100200100	Equipment	HR	80	$1,684.03	$134,723	15%	$20,208	3	$154,931
100100200200	Transportation of Equipment	HR	480	$75.71	$36,341	15%	$5,451	3	$41,792
100100200300	Tear Down of Equipment	HR	80	$33.33	$2,666	15%	$400	3	$3,066
100200	**Channel Site Work**				**$2,324,102**	**30%**	**$697,231**		**$3,021,332**
100200100	Stripping	CY	40,000	$0.75	$29,863	30%	$8,959	1,2,4	$38,821
100200200	Exacavation - Dry	CY	379,039	$4.22	$1,600,603	30%	$480,181	1,2,3,4	$2,080,784
100200300	Exacavation - Wet	CY	50,768	$12.47	$633,072	30%	$189,922	1,2,3,4	$822,994
100200400	Dewatering - 4 cfs	HR	744	$69.42	$51,649	30%	$15,495	2,4	$67,144
100200500	Place Topsoil	CY	1,924	$2.96	$5,699	30%	$1,710	1,2,4	$7,409
100200600	Seed	ACR	4	$893.15	$3,215	30%	$965	1,2,4	$4,180
100500	**Road Raise**				**$2,414,101**	**30%**	**$724,230**		**$3,138,331**
100500100	Riprap	CY	35,213	$52.62	$1,852,837	30%	$555,851	2,3,4	$2,408,688
100500200	Clay	CY	79,813	$1.47	$117,124	30%	$35,137	2,3,4	$152,261
100500400	Filter Material	CY	13,307	$33.38	$444,140	30%	$133,242	2,3,4	$577,382
300	**Pressure Pipeline**				**$25,130,896**	**21%**	**$5,154,343**		**$30,285,238**

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09 CHANNELS AND CANALS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
300100	**Mobilization/Demobilization**				**$99,410**	**15%**	**$14,912**		**$114,322**
300100100	Mobilization		0.71						
300100100 01	Equipment	HR	57	$521.77	$29,659	15%	$4,449	3	$34,108
300100100 02	Transportation of Equipment	HR	91	$87.28	$7,938	15%	$1,191	3	$9,128
300100100 03	Setup of Equipment	HR	57	$213.02	$12,109	15%	$1,816	3	$13,925
300100200	Demobilization								
300100200 01	Equipment	HR	57	$521.77	$29,659	15%	$4,449	3	$34,108
300100200 02	Transportation of Equipment	HR	91	$87.28	$7,938	15%	$1,191	3	$9,128
300100200 03	Tear dowm of Equipment	HR	57	$213.02	$12,109	15%	$1,816	3	$13,925
300200	**Station 782+70 - 599+88**				**$13,862,170**	**20%**	**$2,748,180**		**$16,610,349**
300200100	48" DIP								
300200100100	Earthwork	CY	250,270	$2.39	$597,062	30%	$179,119	1,2,4	$776,180
300200100200	Pipeline	LF	18,270	$605.30	$11,058,887	20%	$2,211,777	1,2,4	$13,270,664
300200100300	Bends	EA	6	$13,096.75	$78,580	20%	$15,716	1,4	$94,297
300200200	DIP Vacuum Relief MH- Sta 774+00								
300200200100	CIP Concrete Structure	LS	1	$59,028.70	$59,029	20%	$11,806	1,4	$70,834
300200200200	Piping Components	LS	1	$208,556.36	$208,556	15%	$31,283	1,4	$239,840
300200200300	Other Appurtenances	LS	1	$2,677.47	$2,677	15%	$402	1,4	$3,079
300200210	DIP Vacuum Relief MH- Sta 751+00								
300200210100	CIP Concrete Structure	LS	1	$96,065.57	$96,066	20%	$19,213	1,4	$115,279
300200210200	Piping Components	LS	1	$208,556.36	$208,556	15%	$31,283	1,4	$239,840
300200210300	Other Appurtenances	LS	1	$2,677.47	$2,677	15%	$402	1,4	$3,079
300200220	DIP Vacuum Relief MH- Sta 699+00					`			
300200220100	CIP Concrete Structure	LS	1	$69,039.98	$69,040	20%	$13,808	1,4	$82,848
300200220200	Piping Components	LS	1	$208,556.36	$208,556	15%	$31,283	1,4	$239,840
300200220300	Other Appurtenances	LS	1	$2,677.47	$2,677	15%	$402	1,4	$3,079
300200230	DIP Vacuum Relief MH- Sta 667+00								
300200230100	CIP Concrete Structure	LS	1	$59,793.94	$59,794	20%	$11,959	1,4	$71,753
300200230200	Piping Components	LS	1	$208,556.36	$208,556	15%	$31,283	1,4	$239,840
300200230300	Other Appurtenances	LS	1	$2,677.47	$2,677	15%	$402	1,4	$3,079
300200240	DIP Vacuum Relief MH- Sta 625+50								
300200240100	CIP Concrete Structure	LS	1	$59,028.70	$59,029	20%	$11,806	1,4	$70,834

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09 CHANNELS AND CANALS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
300200240200	Piping Components	LS	1	$208,556.36	$208,556	15%	$31,283	1,4	$239,840
300200240300	Other Appurtenances	LS	1	$2,677.47	$2,677	15%	$402	1,4	$3,079
300200250	DIP Vacuum Relief MH- Sta 600+83								
300200250100	CIP Concrete Structure	LS	1	$60,552.71	$60,553	20%	$12,111	1,4	$72,663
300200250200	Piping Components	LS	1	$208,556.36	$208,556	15%	$31,283	1,4	$239,840
300200250300	Other Appurtenances	LS	1	$2,677.47	$2,677	15%	$402	1,4	$3,079
300200400	Pump-Out Structure - Sta 777+79								
300200400075	Earthwork	CY	712	$4.63	$3,297	20%	$659	1,2,3,4	$3,956
300200400100	Concrete Structure	LS	1	$22,013.60	$22,014	20%	$4,403	1,2,4	$26,416
300200400200	Piping Components	LS	1	$90,460.97	$90,461	15%	$13,569	1,2,4	$104,030
300200440	Pump-Out Structure - Sta 623+75								
300200440050	Earthwork	CY	1,508	$5.43	$8,194	20%	$1,639	1,2,4	$9,832
300200440100	Concrete Structure	LS	1	$18,924.56	$18,925	20%	$3,785	1,4	$22,709
300200440200	Piping Components	LS	1	$91,992.58	$91,993	15%	$13,799	1,4	$105,791
300200500	Road/Railroad Crossings								
300200500100	Sta 775+00 - Gravel Road	LS	1	$658.90	$659	20%	$132	1,4	$791
300200500200	Sta 750+75 - Asphalt Road	LS	1	$3,161.88	$3,162		$0	1,4	$3,162
300200500300	Sta 694+50 - Gravel Road	LS	1	$658.90	$659	20%	$132	1,4	$791
300200500400	Sta 634+25 - Gravel Road	LS	1	$658.90	$659	20%	$132	1,4	$791
300200700	DIP/RCPP Transition Manifold Str								
300200700 10	CIP Base Slab	CY	56	$197.89	$11,072	15%	$1,661	1,4	$12,733
300200700 20	CIP Side Walls	CY	19	$322.00	$6,189	15%	$928	1,4	$7,117
300200700 30	CIP Top Slab	CY	57	$182.13	$10,327	15%	$1,549	1,4	$11,876
300200700 40	CIP 84" Outlet End	CY	1	$335.51	$369	15%	$55	1,4	$424
300200700 50	CIP 48" Inlet End	CY	6	$200.00	$1,200	15%	$180	1,4	$1,380
300200700 60	Chamfer	CY	6	$200.00	$1,200	15%	$180	1,4	$1,380
300200700 70	48" Waterstop Wall Pipe	EA	3	$7,621.38	$22,864	15%	$3,430	1,4	$26,294
300200800	Valve Vault								
300200800100	Structure	LS	1	$56,996.34	$56,996	15%	$8,549	1,4	$65,546
300200800200	Piping Components	LS	1	$92,206.22	$92,206	15%	$13,831	1,4	$106,037
300200800300	Other Appurtenances	LS	1	$14,283.95	$14,284	15%	$2,143	1,4	$16,427
300300	**Station 599+88 - 345+95**				**$11,169,316**	**21%**	**$2,391,252**		**$13,560,567**
300300100	84" RCPP								

Devils Lake Outlet
Construction Cost Estimate Summary

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Pricing Date: Jul-02

09 CHANNELS AND CANALS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
300300100100	Earthwork	CY	411,445	$2.34	$961,488	30%	$288,447	1,2,4	$1,249,935
300300100200	Pipeline	LF	23,004	$379.39	$8,727,408	20%	$1,745,482	1,2,4	$10,472,890
300300200	RCPP Vacuum Relief - Sta 593+80								
300300200150	Structure	LS	1	$20,612.45	$20,612	15%	$3,092	1,4	$23,704
300300200250	Piping	LS	1	$15,086.31	$15,086	15%	$2,263	1,4	$17,349
300300200350	Appurtenances	LS	1	$7,397.41	$7,397	15%	$1,110	1,4	$8,507
300300210	RCPP Vacuum Relief - Sta 561+00								
300300210150	Structure	LS	1	$20,612.45	$20,612	15%	$3,092	1,4	$23,704
300300210250	Piping	LS	1	$15,102.05	$15,102	15%	$2,265	1,4	$17,367
300300210350	Appurtenances	LS	1	$7,397.41	$7,397	15%	$1,110	1,4	$8,507
300300220	RCPP Vacuum Relief - Sta 516+25								
300300220150	Structure	LS	1	$20,612.45	$20,612	15%	$3,092	1,4	$23,704
300300220250	Piping	LS	1	$15,086.31	$15,086	15%	$2,263	1,4	$17,349
300300220350	Appurtenances	LS	1	$7,397.41	$7,397	15%	$1,110	1,4	$8,507
300300230	RCPP Vacuum Relief - Sta 452+00								
300300230150	Structure	LS	1	$20,612.45	$20,612	15%	$3,092	1,4	$23,704
300300230250	Piping	LS	1	$15,131.56	$15,132	15%	$2,270	1,4	$17,401
300300230350	Appurtenances	LS	1	$7,397.41	$7,397	15%	$1,110	1,4	$8,507
300300240	RCPP Vacuum Relief - Sta 398+50								
300300240150	Structure	LS	1	$20,612.45	$20,612	15%	$3,092	1,4	$23,704
300300240250	Piping	LS	1	$15,086.31	$15,086	15%	$2,263	1,4	$17,349
300300240350	Appurtenances	LS	1	$7,397.41	$7,397	15%	$1,110	1,4	$8,507
300300300	RCPP Access Manhole - Sta 599+44								
300300300100	Structure	LS	1	$10,493.96	$10,494	15%	$1,574	1,4	$12,068
300300300200	Piping	LS	1	$21,053.27	$21,053	15%	$3,158	1,4	$24,211
300300300300	Appurtenances	LS	1	$871.15	$871	15%	$131	1,4	$1,002
300300300	RCPP Access Manhole - Sta 514+40								
300300300100	Structure	LS	1	$10,493.96	$10,494	15%	$1,574	1,4	$12,068
300300300200	Piping	LS	1	$19,268.62	$19,269	15%	$2,890	1,4	$22,159
300300300300	Appurtenances	LS	1	$871.15	$871	15%	$131	1,4	$1,002
300300300	RCPP Access Manhole - Sta 451+40								
300300300100	Structure	LS	1	$10,493.96	$10,494	15%	$1,574	1,4	$12,068
300300300200	Piping	LS	1	$21,946.21	$21,946	15%	$3,292	1,4	$25,238
300300300300	Appurtenances	LS	1	$871.15	$871	15%	$131	1,4	$1,002
300300300	RCPP Access Manhole - Sta 402+20								

Devils Lake Outlet
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Pricing Date: Jul-02

09 CHANNELS AND CANALS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
300300300100	Structure	LS	1	$10,493.96	$10,494	15%	$1,574	1,4	$12,068
300300300200	Piping	LS	1	$18,911.94	$18,912	15%	$2,837	1,4	$21,749
300300300300	Appurtenances	LS	1	$871.15	$871	15%	$131	1,4	$1,002
300300400	Road/Railroad Crossings								
300300400100	Sta 536+75 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300300400200	Sta 515+00 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300300400300	Sta 483+80 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300300400400	Sta 451+50 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300300400500	Sta 402+00 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300300500	Reservoir								
300300500100	Earthwork	LS	1	$900,892.20	$900,892	30%	$270,268	1,2,4	$1,171,160
300300500200	Inlet	LS	1	$129,808.75	$129,809	15%	$19,471	1,2,4	$149,280
300300500400	Equilization Pipe	LS	1	$62,993.67	$62,994	15%	$9,449	1,2,4	$72,443
300300500500	Reservoir Exit	LS	1	$42,007.71	$42,008	15%	$6,301	1,2,4	$48,309
300	**Gravity Pipeline**				**$11,795,834**		**$2,361,620**		**$14,157,455**
300100	**Mobilization/Demobilization**				**$40,500**	**15%**	**$6,075**		**$46,575**
300100100	Mobilization		0.29						
300100100 01	Equipment	HR	23	$521.77	$12,083	15%	$1,812	3	$13,896
300100100 02	Transportation of Equipment	HR	37	$87.28	$3,234	15%	$485	3	$3,719
300100100 03	Setup of Equipment	HR	23	$213.02	$4,933	15%	$740	3	$5,673
300100200	Demobilization								
300100200 01	Equipment	HR	23	$521.77	$12,083	15%	$1,812	3	$13,896
300100200 02	Transportation of Equipment	HR	37	$87.28	$3,234	15%	$485	3	$3,719
300100200 03	Tear dowm of Equipment	HR	23	$213.02	$4,933	15%	$740	3	$5,673
300400	**Station 345+95 - 315+00**				**$1,159,668**	**21%**	**$243,637**		**$1,403,305**
300400100	84" RCPP								

Devils Lake Outlet
Construction Cost Estimate Summary

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Pricing Date: Jul-02

09 CHANNELS AND CANALS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
300400100100	Earthwork	CY	55,221	$2.19	$120,976	30%	$36,293	1,2,4	$157,268
300400100200	Pipeline - 25 ft. Pressure Head	LF	3,089	$333.54	$1,030,298	20%	$206,060	1,2,4	$1,236,358
300400300600	Manhole Air Release - Sta 331+20	EA	1	$7,886.87	$7,887	15%	$1,183	1,4	$9,070
300400400	Road/Railroad Crossings								
300400400100	Sta 330+75 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300500	**Station 315+00 - 0+00**				**$10,595,666**		**$2,111,909**		**$12,707,574**
300500100	84" RCPP								
300500100150	Earthwork	CY	311,427	$2.09	$650,143	20%	$130,029	1,2,4	$780,172
300500100250	Pipeline - 25 ft. Pressure Head	LF	15,691	$335.96	$5,271,494	20%	$1,054,299	1,2,4	$6,325,792
300500200	72"to 84" RCPP Transition MH	LS	1	$3,767.07	$3,767	15%	$565	1,4	$4,332
300500300	72" RCPP								
300500300150	Earthwork	CY	152,523	$2.19	$334,348	20%	$66,870	1,2,4	$401,217
300500300250	Pipeline - 25 ft. Pressure Head	LF	9,009	$269.37	$2,426,788	20%	$485,358	1,2,4	$2,912,145
300500300300	Bends - 7.5 Degree	EA	16	$1,833.13	$29,330	20%	$5,866	1,2,4	$35,196
300500400	66" to 72" RCPP Transition MH	LS	1	$3,101.56	$3,102	15%	$465	1,4	$3,567
300500500	66" RCPP								
300500500150	Earthwork	CY	87,545	$2.48	$217,257	20%	$43,451	1,2,4	$260,708
300500500250	Pipeline - 25 ft. Pressure Head	LF	6,710	$210.58	$1,412,961	20%	$282,592	1,2,4	$1,695,553
300500500300	Bends - 7.5 Degree	EA	45	$1,554.28	$69,943	20%	$13,989	1,2,4	$83,931
300500625	Manhole Air Release								
300500625600	Manhole Air Release - Sta 288+20	EA	1	$7,886.87	$7,887	15%	$1,183	1,4	$9,070
300500625610	Manhole Air Release - Sta 268+80	EA	1	$7,502.81	$7,503	15%	$1,125	1,4	$8,628
300500625620	Manhole Air Release - Sta 228+85	EA	1	$7,118.74	$7,119	15%	$1,068	1,4	$8,187
300500625630	Manhole Air Release - Sta 183+50	EA	1	$5,736.13	$5,736	15%	$860	1,4	$6,597
300500625640	Manhole Air Release - Sta 165+20	EA	1	$6,836.68	$6,837	15%	$1,026	1,4	$7,862
300500625700	Manhole Air Release - Sta 117+80	EA	1	$6,026.02	$6,026	15%	$904	1,4	$6,930
300500625710	Manhole Air Release - Sta 85+00	EA	1	$5,411.52	$5,412	15%	$812	1,4	$6,223
300500625720	Manhole Air Release - Sta 68+50	EA	1	$5,104.27	$5,104	15%	$766	1,4	$5,870
300500625760	Manhole Air Release - Sta 48+80	EA	1	$4,420.24	$4,420	15%	$663	1,4	$5,083
300500625770	Manhole Air Release - Sta 26+00	EA	1	$4,420.24	$4,420	15%	$663	1,4	$5,083
300500625780	Manhole Air Release - Sta 3+50	EA	1	$5,111.55	$5,112	15%	$767	1,4	$5,878
300500800	Road/Railroad Crossings								
300500800100	Sta 287+50 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608

Devils Lake Outlet
Construction Cost Estimate Summary

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Pricing Date: Jul-02

09 CHANNELS AND CANALS						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
300500800200	Sta 267+00 - Asphalt Road	LS	1	$3,368.77	$3,369	20%	$674	1,4	$4,043
300500800250	Sta 229+00 - Burlington Northern	LS	1	$8,595.15	$8,595	20%	$1,719	1,4	$10,314
300500800300	Sta 222+25 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300500800400	Sta 183+60 - Gravel Road	LS	1	$506.85	$507	20%	$101	1,4	$608
300500800500	Sta 118+00 - Asphalt Road	LS	1	$3,368.85	$3,369	20%	$674	1,4	$4,043
300500900	SPPA Energy Dissipator								
300500900050	Earthwork	CY	2,010	$7.68	$15,442	20%	$3,088	1,2,4	$18,530
300500900100	Outlet Structure	LB	6,300	$10.37	$65,358	15%	$9,804	1,2,4	$75,161
300500900200	Bulkhead	LS	1	$6,689.95	$6,690	15%	$1,003	1,2,4	$7,693
300500900300	Riprap	CY	112	$59.08	$6,617	20%	$1,323	1,2,4	$7,940

Reason for Contingencies: Uncertainties in:	
1	Quantities
2	Site Conditions
3	Haul Distances
4	Unit Pricing

Table 5
Dry Lake Diversion
Project Cost Estimate Summary

Estimated Construction Cost (Includes Contingencies)	**$2,673,700**
Engineering and Design (25% of Construction Cost)	$668,400
Construction Engineering, Supervision, and Admin. (7.5% of Construction Cost)	$200,500
Environmental Mitigation [a]	**$1,015,100**
Cultural Resources Survey [b]	**$2,866,000**
Real Estate [c]	$2,494,000
Total Estimated First Costs	**$9,917,700**

Annual Cost of Estimated Total First Costs	$662,400
Term: 50 years	
Interest Rate: 6.375%	
Annual Operation and Maintenance Cost	$32,500

Total Est. Annual Cost	**$694,900**

[a] Includes $1,000,000 for Lake Alice National Wildlife Refuge compatibility compliance. Costs provided by St. Paul District Corps of Engineers.

[b] Costs are for surveys only. Does not include possible future costs for cultural resources site evaluation and mitigation. Costs provided by St. Paul District Corps of Engineers.

[c] Includes all real estate costs. Includes administration costs for acquisition. Costs provided by St. Paul District Corps of Engineers.

Dry Lake Diversion Project

CONSTRUCTION COST SUMMARY

2/26/2003 14:01

	Construction ($)	Contingency ($)	Contingency (%)	Construction $ + Contingency ($)	
1 Mobilization/Demobilization	$93,400	$37,400	40%	$130,800	
2 Connection Channel from Dry Lake to Mikes Lake	$507,200	$195,500	39%	$702,700	
3 Outlet Structure from Dry Lake to Mikes Lake	$169,700	$58,600	35%	$228,300	
4 Channel A Outlet Structure	$567,800	$195,200	34%	$763,000	
5 Flow Monitoring Structure on Big Coulee	$30,000	$7,500	25%	$37,500	
6 Mikes Lake Outlet Improvements	$219,856	$81,400	37%	$301,300	
7 Chain Lake Outlet Improvements	$219,856	$81,400	37%	$301,300	
8 Lake Alice Outlet Improvements	$154,515	$54,300	35%	$208,800	
	$ 1,962,327	$711,300	**TOTAL**	**$2,673,700**	See note below

Notes:

1. This total cost does not include costs for engineering and design; construction engineering, supervision, and administration; environmental mitigation; cultural resources surveys; or real estate. These costs are included in Summary Table 5.

Total Real Estate Quantities			
Connection Channel from Dry Lake to Mikes Lake	17.1 Acres		
Outlet Structure from Dry Lake to Mikes Lake	0.4 Acres		
Channel A Outlet Structure	0.7 Acres		
Flow Monitoring Structure on Big Coulee	0.0 Acres		
Mikes Lake Outlet Improvements	3.4 Acres		
Chain Lake Outlet Improvements	3.4 Acres	Government-owned land, no cost for real estate	
Lake Alice Outlet Improvements	4.8 Acres	Government-owned land, no cost for real estate	
Total	**29.9 Acres**	$74,000 (cost provided by St. Paul District Corps)	

Flowage Easements			
Around Lake Alice to El. 1446	7,000 Acres	$0	No cost since land already owned by Government
Around Chain Lake to El. 1446	4,000 Acres	$258,000	Costs provided by St. Paul District Corps
Around Mikes Lake to El. 1446	1,000 Acres	$178,000	Costs provided by St. Paul District Corps
Dry Lake and around Dry lake to El. 1458	16,600 Acres	$1,984,000	Costs provided by St. Paul District Corps
Total	**28,600 Acres**	**$2,420,000**	Costs provided by St. Paul District Corps

O&M Costs	**Percentage**	**Cost**	**Comments**
Mobilization/Demobilization	0.00%	$0	
Connection Channel from Dry Lake to Mikes Lake	0.50%	$3,514	Assumes 1/2% of construction cost for O&M of open channel (same as FDR)
Outlet Structure from Dry Lake to Mikes Lake	1.00%	$2,283	Assumes 1% of construction cost for O&M of control structures (same as FDR)
Channel A Outlet Structure	1.00%	$7,630	Assumes 1% of construction cost for O&M of control structures (same as FDR)
Flow Monitoring Structure on Big Coulee		$12,000	Obtained from NDUSGS, includes repair and maintenance of the gage, calibration, data reduction, and report of results
Mikes Lake Outlet Improvements	1.00%	$3,013	Assumes 1% of construction cost for O&M of control structures (same as FDR)
Chain Lake Outlet Improvements	1.00%	$3,013	Assumes 1% of construction cost for O&M of control structures (same as FDR)
Lake Alice Outlet Improvements	0.50%	$1,044	Assumes 1/2% of construction cost for O&M of open channel (same as FDR)
	Total	**$32,497**	

Dry Lake Diversion Project
DETAILED COST ESTIMATE
2/26/2003 14:01

ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
1	**Mobilization/Demobilization**	LS	1	$93,447.17	$93,447	40%	$37,379		*Assumed to be 5% of Project Subtotal*
				Subtotal	**$93,447**				
				Subtotal w/ Contingencies	**$130,826**				
				Contingency percentage:	**40%**				
2	**Connection Channel from Dry Lake to Mikes Lake**								
	Stripping	CY	5,538	$3.00	$16,613	25%	$4,153	(2)	*"All Features" N460, 15% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Excavation - Wet	CY	45,778	$7.00	$320,448	40%	$128,179	(2)	*Assumes, 50% wet excavation, "All Features" N7, 15% contingency for uncertainty in length, 15% uncertainty in elevation, 10% contingency for uncertainty in unit price*
	Excavation - Dry	CY	45,778	$3.00	$137,335	40%	$54,934	(2)	*Assumes, 50% wet excavation,"All Features" N20, 15% contingency for uncertainty in length, 15% uncertainty in elevation, 10% contingency for uncertainty in unit price*
	Seed/Topsoil	SY	32,778	$1.00	$32,778	25%	$8,194	(2)	*Unit costs are taken from Peterson Coulee Open Channel Costs ("All Features, line 453), 15% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
				Subtotal	**$507,174**				
				Subtotal w/ Contingencies	**$702,635**				
				Contingency percentage:	**39%**				
3	**Outlet Structure from Dry Lake to Mikes Lake**								
	Cofferdam at Mike's Lake - Earth Cofferdam	CY	1,900	$5.00	$9,500	35%	$3,325	(2)	*Assumes random fill earth cofferdam, "All Features" N150, 20% contingency for uncertainty in length, 15% contingency for uncertainty in unit price*
	Intake Stripping	CY	120	$3.00	$360	25%	$90	(2)	*"All Features" N460, 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Intake Excavation - Dry	CY	1,300	$3.00	$3,900	25%	$975	(2)	*Assumes dry excavation, "All Features" N20, 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Intake Wingwalls	CY	48	$500.00	$24,000	40%	$9,600	(2)	*"All Features" N159, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*

Dry Lake Diversion Project
DETAILED COST ESTIMATE
2/26/2003 14:01

ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
3	Intake Apron	CY	61	$400.00	$24,400	40%	$9,760	(2)	*"All Features" N158, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Intake Piers	CY	12	$500.00	$6,000	40%	$2,400	(1)	*"All Features" N159, plus increase for small volume and extra forming for stoplog slots, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Concrete Walkway	CY	10	$500.00	$5,000	40%	$2,000	(1)	*"All Features" N159, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Intake Backfill and Compaction	CY	650	$5.00	$3,250	25%	$813	(1)	*Total unit cost taken as-is from 3/99 cost summary breakdown (pg 49,50 of 79), 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Stoplogs	EA	85	$50.00	$4,250	35%	$1,488	(5)	*Assumed 4"x4" timber stoplogs, Means 06110-575-0200 plus additional cost to cut and install, 15% contingency for uncertainty in elevation, 20% contingency for uncertainty in unit price*
	Box Culvert Stripping	CY	53	$3.00	$159	25%	$40	(2)	*"All Features" N460, 15% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Box Culvert Excavation - Dry	CY	1,140	$3.00	$3,420	25%	$855	(2)	*Assumes dry excavation, "All Features" N20, 15% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Box Culvert Bedding	CY	13	$30.00	$390	25%	$98	(5)	*Means 02315-130-0050, 02315-130-0500, 15% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Box Culvert	LF	70	$700.00	$49,000	30%	$14,700	(5)	*Material Costs from Cretex Concrete, Installation costs supplied by Gary Smith (Corps), 15% contingency for uncertainty in length, 15% contingency for uncertainty in unit price*
	Box Culvert Backfill and Compaction	CY	940	$5.00	$4,700	25%	$1,175	(1)	*Total unit cost taken as-is from 3/99 cost summary breakdown (pg 49,50 of 79), 15% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*

Dry Lake Diversion Project
DETAILED COST ESTIMATE
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ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
3	Gravel Road Restoration	SY	99	$8.00	$791	25%	$198	(5)	*Means 02720-200-0302, 15% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Outlet Stripping	CY	58	$3.00	$174	25%	$44	(2)	*"All Features" N460, 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Excavation - Dry	CY	1,066	$3.00	$3,198	25%	$800	(2)	*Assumes dry excavation, "All Features" N20, 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Wingwalls	CY	26	$500.00	$13,000	40%	$5,200	(2)	*"All Features" N159, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Outlet Apron	CY	25	$400.00	$10,000	40%	$4,000	(2)	*"All Features" N158, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Outlet Backfill and Compaction	CY	370	$5.00	$1,850	25%	$463	(1)	*Total unit cost taken as-is from 3/99 cost summary breakdown (pg 49,50 of 79), 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Site Grading	SY	2,079	$0.15	$312	25%	$78	(5)	*Means 02310-440-3300, 15% contingency for uncertainty in elevation, 10% contingency for uncertainty in unit price*
	Seed/Topsoil	SY	2,079	$1.00	$2,079	25%	$520	(2)	*Unit costs are taken from Peterson Coulee Open Channel Costs ("All Features, line 453), 15% contingency for uncertainty in elevation, 10% contingency for uncertainty in unit price*
				Subtotal	**$169,733**				
				Subtotal w/ Contingencies	**$228,351**				
				Contingency percentage:	**35%**				

Dry Lake Diversion Project
DETAILED COST ESTIMATE
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ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
4	**Channel A Outlet Structure**								
	Stripping	CY	370	$3.00	$1,110	25%	$278	(2)	*"All Features" N460, 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Excavation - Wet	CY	310	$7.00	$2,170	25%	$543	(2)	*"All Features" N7, 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Intake Wingwalls	CY	244	$500.00	$122,000	40%	$48,800	(2)	*"All Features" N159, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Intake Headwall	CY	163	$500.00	$81,500	40%	$32,600	(2)	*"All Features" N159, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Intake Apron	CY	33	$400.00	$13,200	40%	$5,280	(2)	*Page 32 of 79, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Slide Gates	EA	2	$30,000.00	$60,000	30%	$18,000	(5)	*Means 11285-600-0190, prorated, 15% contingency for uncertainty in member sizes, 15% contingency for uncertainty in unit price*
	Box Culverts	LF	100	$800.00	$80,000	30%	$24,000	(5)	*Installation Cost provided by Gary Smith (Corps), Material Costs from Cretex Concrete, 15% contingency for uncertainty in length, 15% contingency for uncertainty in unit price*
	Outlet Headwall	CY	30	$500.00	$15,000	40%	$6,000	(2)	*"All Features" N159, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Outlet Wingwalls	CY	175	$500.00	$87,500	40%	$35,000	(2)	*"All Features" N159, 15% contingency for uncertainty in elevation, 15% contingency for uncertainty in member sizes, 10% contingency for uncertainty in unit price*
	Embankment Backfill and Compaction	CY	13,600	$5.00	$68,000	25%	$17,000	(1)	*Total unit cost taken as-is from 3/99 cost summary breakdown (pg 49,50 of 79), 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Riprap	CY	670	$50.00	$33,500	20%	$6,700	(2)	*"All Features" N53, 10% contingency for uncertainty in quantity, 10% contingency for uncertainty in unit price*

Dry Lake Diversion Project
DETAILED COST ESTIMATE
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ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
4	Site Grading	SY	3330	$0.15	$500	25%	$125	(5)	*Means 02310-440-3300, 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Seed/Topsoil	SY	3330	$1.00	$3,330	25%	$833	(2)	*Unit costs are taken from Peterson Coulee Open Channel Costs ("All Features, line 453), 15% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
				Subtotal	**$567,810**				
				Subtotal w/ Contingencies	**$762,967**				
				Contingency percentage:	**34%**				
5	**Flow Monitoring Structure on Big Coulee**								
	USGS Gaging Station *	LS	1	$30,000.00	$30,000	25%	$7,500	(6)	*Assumes one acoustic Doppler velocity meter on the downstream bridgepier of Hwy. 2. 25% contingency for uncertainty in unit price*
				Subtotal	**$30,000**				
				Subtotal w/ Contingencies	**$37,500**				
				Contingency percentage:	**25%**				
6	**Mikes Lake Outlet Improvements**								
	Channel Widening/Deeping (Wet)	CY	15,000	$7.00	$105,000	35%	$36,750	(2)	*"All Features" N7, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Excavation - Wet	CY	2,000	$7.00	$14,000	35%	$4,900	(2)	*"All Features" N7, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Box Culvert Bedding	CY	22	$30.00	$660	35%	$231	(5)	*Means 02315-130-0050, 02315-130-0500, 25% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Outlet Box Culverts	LF	80	$800.00	$64,000	40%	$25,600	(5)	*Installation Cost provided by Gary Smith (Corps), Material Costs from Cretex Concrete, 25% contingency for uncertainty in length, 15% contingency for uncertainty in unit price*
	Outlet Box Culvert End Sections	EA	2	$13,000.00	$26,000	40%	$10,400	(5)	*Installation Cost provided by Gary Smith (Corps), Material Costs from Cretex Concrete, 25% contingency for uncertainty in length, 15% contingency for uncertainty in unit price*

Dry Lake Diversion Project
DETAILED COST ESTIMATE
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ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
6	Outlet Embankment Backfill and Compaction	CY	1,680	$5.00	$8,400	35%	$2,940	(1)	*Total unit cost taken as-is from 3/99 cost summary breakdown (pg 49,50 of 79), 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Site Grading	SY	400	$0.15	$60	35%	$21	(5)	*Means 02310-440-3300, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Gravel Road Restoration	SY	167	$8.00	$1,336	35%	$468	(5)	*Means 02720-200-0302, 25% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Outlet Seed/Topsoil	SY	400	$1.00	$400	35%	$140	(2)	*Unit costs are taken from Peterson Coulee Open Channel Costs ("All Features, line 453), 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
				Subtotal	**$219,856**				
				Subtotal w/ Contingencies	**$301,306**				
				Contingency percentage:	**37%**				
7	**Chain Lake Outlet Improvements**								
	Channel Widening/Deeping (Wet)	CY	15,000	$7.00	$105,000	35%	$36,750	(2)	*"All Features" N7, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Excavation - Wet	CY	2,000	$7.00	$14,000	35%	$4,900	(2)	*"All Features" N7, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Box Culvert Bedding	CY	22	$30.00	$660	35%	$231	(5)	*Means 02315-130-0050, 02315-130-0500, 25% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Outlet Box Culverts	LF	80	$800.00	$64,000	40%	$25,600	(5)	*Installation Cost provided by Gary Smith (Corps), Material Costs from Cretex Concrete, 25% contingency for uncertainty in length, 15% contingency for uncertainty in unit price*
	Outlet Box Culvert End Sections	EA	2	$13,000.00	$26,000	40%	$10,400	(5)	*Installation Cost provided by Gary Smith (Corps), Material Costs from Cretex Concrete, 25% contingency for uncertainty in length, 15% contingency for uncertainty in unit price*

Dry Lake Diversion Project
DETAILED COST ESTIMATE
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ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
7	Outlet Embankment Backfill and Compaction	CY	1,680	$5.00	$8,400	35%	$2,940	(1)	*Total unit cost taken as-is from 3/99 cost summary breakdown (pg 49,50 of 79), 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Site Grading	SY	400	$0.15	$60	35%	$21	(5)	*Means 02310-440-3300, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Outlet Gravel Road Restoration	SY	167	$8.00	$1,336	35%	$468	(5)	*Means 02720-200-0302, 25% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Outlet Seed/Topsoil	SY	400	$1.00	$400	35%	$140	(2)	*Unit costs are taken from Peterson Coulee Open Channel Costs ("All Features, line 453), 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
				Subtotal	**$219,856**				
				Subtotal w/ Contingencies	**$301,306**				
				Contingency percentage:	**37%**				

Dry Lake Diversion Project
DETAILED COST ESTIMATE
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ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST ($)	AMOUNT ($)	CONTINGENCY (%)	CONTINGENCY ($)	SOURCE(S)	REMARKS
8	**Lake Alice Outlet Improvements**								
	Channel Widening/Deeping (Wet)	CY	21,000	$7.00	$147,000	35%	$51,450	(2)	*"All Features" N7, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Spillway Stripping	CY	215	$3.00	$645	35%	$226	(2)	*"All Features" N460, 25% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Spillway Excavation - Wet	CY	160	$7.00	$1,120	45%	$504	(2)	*"All Features" N7, 35% contingency for uncertainty in area, 10% contingency for uncertainty in unit price*
	Spillway Bedding	CY	25	$30.00	$750	45%	$338	(5)	*Means 02315-130-0050, 02315-130-0500, 35% contingency for uncertainty in length, 10% contingency for uncertainty in unit price*
	Spillway Riprap	CY	100	$50.00	$5,000	35%	$1,750	(2)	*"All Features" N53, 25% contingency for uncertainty in quantity, 10% contingency for uncertainty in unit price*
				Subtotal	**$154,515**				
				Subtotal w/ Contingencies	**$208,782**				
				Contingency percentage:	**35%**				

(1) Evaluation of Devils Lake Outlet Design Alternatives, Barr Engineering, March 1999
(2) Corps of Engineers 1999 Value Engineering Cost Spreadsheet
(3) Corps of Engineers 1999 Alternative Cost Comparisons Memorandum
(4) Corps of Engineers Table 1H
(5) Means 2001 Heavy Construction Cost Data
(6) Devils Lake Outlet Cost Data, obtained from Al Fandrey (Barr)

* Based on cost to agencies with a Cooperative Agreement with the USGS.

ED-D(GRS)

09 CHANNELS AND CANALS
DEVILS LAKE OUTLET
SHEYENNE RIVER DAM MODIFICATIONS

Date Prepared 11/04/02

	$42.00 ROCKFILL, CY		$51.00 RIPRAP, CY		$50.00 BEDDING, CY		$6.00 EXCAV, CY		$2.00 DEWATERING	
	QTY	AMNT	QTY	AMNT	QTY	AMNT	QTY	AMNT	QTY	AMNT
1 Bouret Dam	100	4,208	625	31,858	312	15,617	1,406	8,433	1,406	2,811
2 Sheyenne	147	6,189	607	30,978	304	15,185	1,367	8,200	1,367	2,733
3 Ueland Dam	474	19,911	852	43,444	426	21,296	1,917	11,500	1,917	3,833
4 Valley City Mill	1,016	42,684	974	49,678	487	24,352	1,917	11,500	2,192	4,383
5 Valley City Park	242	10,164	739	37,683	369	18,472	2,192	13,150	1,663	3,325
6 Brown Dam	472	19,803	873	44,523	436	21,800	1,663	9,975	1,963	3,927
7 Kathryn	298	12,502	1,123	57,297	562	28,087	2,528	15,167	2,528	5,056
8 Fort Ransom	446	18,743	535	27,294	268	13,380	1,204	7,225	1,204	2,408
9 Lisbon	697	29,269	812	41,404	406	20,296	1,827	10,960	1,827	3,653
10 Soldiers Home	122	5,103	750	38,250	375	18,750	1,688	10,125	1,688	3,375
Quantity Total	4,014		7,890		3,945		17,706		17,752	
Amount Total		168,576		402,409		197,235		106,235		35,504

Total Amount				910,000
Structural Rehabilitation	10	20,000		200,000
Mob, Site Prep	10	10,000		100,000
Total				1,210,000
Contingencies			50%	605,000
TOTAL ESTIMATED AMOUNT WITH CONTINGENCIES				**1,815,000**
Real Estate				
Environmental Mitigation				0
Cultural Mitigation				0
Planning, Engineering and Design			25%	454,000
Supervision and Administration			8%	145,000
Total Estimated Amount				2,414,000

Devils Lake Outlet
Construction Cost Estimate Summary

Date: 2/26/03 1:44 PM
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Pricing Date: Jul-02

13 PUMPING PLANT						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
200	**Pump Station**				**$10,722,096**	**22%**	**$2,365,991**		**$13,088,087**
200100	**Mobilization/Demobilization**				**$697,043**	**15%**	**$104,556**		**$801,600**
200100100	Pump Station Mobilization								
200100100100	Equipment	EA	1	$186,640.69	$186,641	15%	$27,996	3	$214,637
200100100200	Transportation of Equipment	EA	1	$97,974.13	$97,974	15%	$14,696	3	$112,670
200100100300	Setup of Equipment	EA	1	$63,906.77	$63,907	15%	$9,586	3	$73,493
200100200	Pump Station Demobilization								
200100200100	Equipment	EA	1	$186,640.69	$186,641	15%	$27,996	3	$214,637
200100200200	Transportation of Equipment	EA	1	$97,974.13	$97,974	15%	$14,696	3	$112,670
200100200300	Tear Down of Equipment	EA	1	$63,906.77	$63,907	15%	$9,586	3	$73,493
200200	**Civil Site Layout**				**$978,102**	**24%**	**$239,206**		**$1,217,308**
200200050	City Well Relocation								
200200100	Site Stripping	CY	19,101	$0.78	$14,803	20%	$2,961	1,2,4	$17,764
200200250	Dewatering	LS	1	$42,384.54	$42,385	20%	$8,477	2,4	$50,861
200200280	Slurry Wall	SF	36,580	$5.27	$192,669	20%	$38,534	1,2,4	$231,203
200200300	Excavation	BCY	35,363	$1.58	$55,950	20%	$11,190	1,2,4	$67,140
200200350	Retaining Walls								
200200350100	Footing	CY	145	$190.87	$27,580	30%	$8,274	1,4	$35,855
200200350200	Walls	CY	145	$322.95	$46,666	30%	$14,000	1,4	$60,666
200200400	Wingwalls								
200200400100	Footing	CY	281	$163.54	$46,003	30%	$13,801	1,4	$59,804
200200400200	Walls	CY	190	$329.59	$62,753	30%	$18,826	1,4	$81,579
200200400300	Piling	EA	38	$1,793.23	$68,143	30%	$20,443	1,4	$88,585
200200450	Backfill - Placement	BCY	23,341	$0.55	$12,853	30%	$3,856	1,4	$16,709
200200460	Backfill - Compaction	BCY	23,341	$0.43	$10,046	30%	$3,014	1,4	$13,060
200200470	Additional Fill - Placement	BCY	44,603	$0.55	$24,562	30%	$7,368	1,4	$31,930
200200480	Additional Fill - Compaction	BCY	44,603	$0.43	$19,197	30%	$5,759	1,4	$24,957
200200500	Engineered Backfill - Placement	BCY	12,023	$7.22	$86,815	30%	$26,045	1,4	$112,860
200200510	Engineered Backfill - Compaction	BCY	12,023	$2.60	$31,237	30%	$9,371	1,4	$40,608
200200600	Topsoil - Placement	CY	19,101	$3.70	$70,732	20%	$14,146	1,4	$84,879
200200610	Seed	ACR	3	$893.15	$2,858	20%	$572	1,4	$3,430

Devils Lake Outlet
Construction Cost Estimate Summary

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Pricing Date: Jul-02

13 PUMPING PLANT						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
200200620	Gravel Roadway Surface	CY	2,061	$45.37	$93,508	20%	$18,702	1,3,4	$112,210
200200630	Site Drainage								
200200630100	18" RCP	LF	232	$25.35	$5,880	20%	$1,176	2,4	$7,056
200200630200	Manhole 1	LS	1	$2,856.95	$2,857	20%	$571	2,4	$3,428
200200630300	Manhole 2	LS	1	$2,518.72	$2,519	20%	$504	2,4	$3,022
200200650	Sanitary Facility								
200200650010	Drain Pipe	LF	250	$24.02	$6,004	20%	$1,201	1,2,4	$7,205
200200650020	Septic Tank	EA	1	$1,529.29	$1,529	20%	$306	1,2,4	$1,835
200200650030	Drain Field	LF	100	$18.41	$1,841	20%	$368	1,2,4	$2,209
200200700	Potable Water Well								
200200700010	Well	LF	50	$46.65	$2,332	20%	$466	1,2,4	$2,799
200200700020	Pump	EA	1	$660.62	$661	20%	$132	1,2,4	$793
200200700030	Distribution Line	LF	500	$20.52	$10,260	20%	$2,052	1,2,4	$12,311
200200700040	Holding Tank	EA	1	$371.98	$372	20%	$74	1,2,4	$446
200200750	Water Sampling Equipment								
200200750010	Water Sampling Equipment	EA	1	$2,943.53	$2,944	20%	$589	1,2,4	$3,532
200200750020	Equipment Shelter	EA	1	$1,358.53	$1,359	20%	$272	1,2,4	$1,630
200200750030	Telemetry	EA	1	$5,353.82	$5,354	20%	$1,071	1,2,4	$6,425
200200800	Telemetry Equipment	LS	1	$25,430.65	$25,431	20%	$5,086	1,2,4	$30,517
200300	**Pump Station and Motor Control**				**$3,418,085**	**20%**	**$697,809**		**$4,115,895**
200300100	Substructure								
200300100100	Headwall	CY	220	$238.11	$52,385	20%	$10,477	1,2,4	$62,861
200300100150	Backwall	CY	308	$213.18	$65,659	20%	$13,132	1,2,4	$78,791
200300100200	Upstream Pier Nose	CY	87	$439.48	$38,235	20%	$7,647	1,2,4	$45,882
200300100250	Upstream Sidewall Noses	CY	133	$258.97	$34,444	20%	$6,889	1,2,4	$41,332
200300100300	Compression Struts	CY	27	$417.20	$11,264	20%	$2,253	1,2,4	$13,517
200300100350	Sidewalls Inside Sump	CY	361	$213.25	$76,982	20%	$15,396	1,2,4	$92,378
200300100400	Piers Inside Sump	CY	310	$231.07	$71,632	20%	$14,326	1,2,4	$85,959
200300100450	Sump Infill Walls	CY	136	$220.34	$29,966	20%	$5,993	1,2,4	$35,960
200300100500	Foundation and Base Slab								
20030010050001	H-Piles	EA	36	$1,606.74	$57,842	20%	$11,568	1,2,4	$69,411
20030010050004	Base Slab	CY	539	$159.92	$86,199	20%	$17,240	1,2,4	$103,439
200300100550	Forebay								
20030010055010	Grating W10x22 Framing	TON	1	$2,027.45	$2,944	20%	$589	1,4	$3,533
20030010055020	Embedded Grating Framing	LB	204	$2.21	$451	20%	$90	1,4	$541

Devils Lake Outlet
Construction Cost Estimate Summary

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Pricing Date: Jul-02

13 PUMPING PLANT						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
20030010055025	Stoplog Slot Framing	LB	3,665	$2.21	$8,098	20%	$1,620	1,4	$9,718
20030010055030	Grating- Galavanized, Steel	SF	315	$10.20	$3,214	20%	$643	1,4	$3,857
20030010055040	Handrail	LF	58	$20.09	$1,165	20%	$233	1,4	$1,398
20030010055050	Vehicle Barrier	LF	58	$132.28	$7,672	20%	$1,534	1,4	$9,207
200300100600	Pump Supports	CY	38	$164.45	$6,249	20%	$1,250	1,4	$7,499
200300200	Superstructure								
200300200100	Slab on Grade	CY	157	$131.18	$20,647	25%	$5,162	1,4	$25,809
200300200125	Major Grade Beams	CY	139	$272.34	$37,855	25%	$9,464	1,4	$47,319
200300200150	Minor Grade Beams	CY	44	$270.83	$11,916	25%	$2,979	1,4	$14,895
200300200160	Pile Caps	CY	14	$344.32	$4,821	25%	$1,205	1,4	$6,026
200300200180	H-Pile	EA	16	$2,062.30	$32,997	25%	$8,249	1,2,4	$41,246
200300200200	Steel Braced Frame Building	SF	5,668	$30.98	$175,610	25%	$43,903	1,4	$219,513
200300300	Piping								
200300300200	Farval Lubricator	EA	1	$7,762.39	$7,762	20%	$1,552	1,3,4	$9,315
200300300250	Pump and Motor Test	EA	1	$24,786.21	$24,786	20%	$4,957	4	$29,743
200300300300	42" Coupling	EA	3	$12,719.63	$38,159	20%	$7,632	1,3,4	$45,791
200300300320	8" Air Relief Valve	EA	3	$2,635.72	$7,907	20%	$1,581	1,4	$9,489
200300300340	6" Air Release Valve	EA	3	$3,848.85	$11,547	20%	$2,309	1,4	$13,856
200300300350	42" Tilting Disc Check Valve	EA	3	$60,061.28	$180,184	20%	$36,037	1,4	$216,221
200300300360	42" Cone Valve	EA	3	$238,274.12	$714,822	20%	$142,964	1,4	$857,787
200300300380	42" Butterfly Valve	LS	1	$265,867.30	$265,867	20%	$53,173	1,4	$319,041
200300300400	Flanged Fitting/Pipe (Class 250)								
20030030040010	42" 90 SR Elbow w/ 6" Fl. Boss	EA	3	$12,123.31	$36,370	20%	$7,274	1,4	$43,644
20030030040020	42" 3 Ft. Spool	EA	9	$2,055.60	$18,500	20%	$3,700	1,4	$22,200
20030030040025	42" 2 Ft Spool	EA	3	$5,918.32	$17,755	20%	$3,551	1,4	$21,306
20030030040030	8"x42" Tap/Saddle	EA	3	$5,623.17	$16,869	20%	$3,374	1,4	$20,243
20030030040040	Pipe Supports	EA	3	$170.54	$512	20%	$102	1,4	$614
200300300500	MJ Fittings								
20030030050010	42" 90 Degree Elbow	EA	3	$12,032.83	$36,099	20%	$7,220	1,4	$43,318
20030030050020	42"x24" Tee	EA	3	$17,819.63	$53,459	20%	$10,692	1,4	$64,151
20030030050030	42" x 48" Reducer	EA	3	$13,989.03	$41,967	20%	$8,393	1,4	$50,361
20030030050040	42" 22.5 Degree Bend	EA	3	$7,121.83	$21,365	20%	$4,273	1,4	$25,639
20030030050050	24" 90 Degree Elbow	EA	3	$3,850.46	$11,551	20%	$2,310	1,4	$13,862
200300300600	MJ Pipe								

Devils Lake Outlet
Construction Cost Estimate Summary

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Prepared By: Carrie Ryan, Barr Engineering Co.
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Pricing Date: Jul-02

13 PUMPING PLANT						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
20030030060010	42" DIP	LF	60	$175.59	$10,535	20%	$2,107	1,4	$12,642
20030030060020	48" DIP	LF	430	$230.28	$99,019	20%	$19,804	1,4	$118,823
20030030060030	48"x6" Tangential Welded	EA	3	$1,713.58	$5,141	20%	$1,028	1,4	$6,169
200300300700	MJxFL Fittings								
20030030070010	42"- 7.5' Sections	EA	3	$7,478.79	$22,436	20%	$4,487	1,4	$26,924
200300400	HVAC								
200300400100	Motor Room	LS	1	$42,219.60	$42,220	20%	$8,444	1,4	$50,664
200300400200	MCC Room	LS	1	$6,472.10	$6,472	20%	$1,294	1,4	$7,767
200300400300	Sump Ventilation	LS	1	$3,197.89	$3,198	20%	$640	1,4	$3,837
200300400400	Heat	LS	1	$13,238.38	$13,238	20%	$2,648	1,4	$15,886
200300500	Trash Racks/ Fish Screens								
200300500100	Footings	CY	20	$178.72	$3,574	20%	$715	1,4	$4,289
200300500200	Fish Screen Frames	TON	13	$1,837.44	$23,703	20%	$4,741	1,4	$28,444
200300500300	Fish Screens	EA	1	$131,633.85	$131,634	20%	$26,327	1,4	$157,961
200300500400	Screen Panel Framing	TON	8	$1,673.42	$13,053	20%	$2,611	1,4	$15,663
200300500500	Trash Raking System	EA	1	$259,591.14	$259,591	20%	$51,918	1,4	$311,509
200300700	Slide Gates	EA	3	$146,846.66	$440,540	20%	$88,108	1,2,4	$528,648
200400	**Meter Vault**				**$180,337**	**15%**	**$27,050**		**$207,387**
200400100	Concrete Structure								
200400100100	Base Slab	CY	45	$209.15	$9,412	15%	$1,412	1,2,4	$10,823
200400100200	Walls	CY	56	$405.07	$22,684	15%	$3,403	1,2,4	$26,086
200400100300	Top Slab	CY	12	$284.09	$3,409	15%	$511	1,2,4	$3,920
200400100400	Manhole Casting	EA	1	$1,160.89	$1,161	15%	$174	1,2,4	$1,335
200400100500	48" Diam. Link Seals	EA	6	$3,075.12	$18,451	15%	$2,768	1,2,4	$21,218
200400200	Piping								
200400200100	48" 6' Flanged Spool	EA	1	$25,125.99	$25,126	15%	$3,769	1,4	$28,895
200400200200	Accusnic Flow Meter	EA	1	$98,618.12	$98,618	15%	$14,793	1,4	$113,411
200400200300	Sump Pump	EA	1	$964.55	$965	15%	$145	1,4	$1,109
200400200400	Pipe Supports	EA	3	$170.54	$512	15%	$77	1,4	$588
200500	**Valve Vault**				**$124,258**	**15%**	**$18,639**		**$142,897**

Devils Lake Outlet
Construction Cost Estimate Summary

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Pricing Date: Jul-02

13 PUMPING PLANT						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
200500100	Valve Vault Structure								
200500100100	Base Slab	CY	19	$212.36	$4,035	15%	$605	1,2,4	$4,640
200500100200	Walls	CY	28	$431.41	$12,080	15%	$1,812	1,2,4	$13,892
200500100300	Top Slab	CY	4	$370.36	$1,481	15%	$222	1,2,4	$1,704
200500100400	36" Diam. Manway Cover	EA	1	$1,160.89	$1,161	15%	$174	1,2,4	$1,335
200500100500	Sump Pump	LS	1	$964.55	$965	15%	$145	1,2,4	$1,109
200500100700	Wall Rungs	EA	17	$25.72	$437	15%	$66	1,2,4	$503
200500100800	10" Diam. Link Seals	EA	4	$1,010.74	$4,043	15%	$606	1,2,4	$4,649
200500200	Sump Manhole								
200500200100	8' Diameter Manhole	EA	1	$18,178.73	$18,179	15%	$2,727	1,2,4	$20,906
200500200200	Base Slab	EA	1	$2,771.90	$2,772	15%	$416	1,2,4	$3,188
200500200300	Top Slab	EA	1	$1,489.43	$1,489	15%	$223	1,2,4	$1,713
200500200400	Manhole Casting	EA	1	$1,160.89	$1,161	15%	$174	1,2,4	$1,335
200500300	Valve Vault Piping								
200500300100	Piping	LS	1	$19,867.81	$19,868	15%	$2,980	1,4	$22,848
200500300200	Pipe Fittings	LS	1	$6,389.58	$6,390	15%	$958	1,4	$7,348
200500300300	Pumps and Valves	LS	1	$50,198.07	$50,198	15%	$7,530	1,4	$57,728
200600	**Surge Tanks**				**$1,046,751**	**20%**	**$209,350**		**$1,256,101**
200600010	Piping								
200600010010	Force Main #1 Piping	LF	228	$193.33	$44,080	20%	$8,816	1,4	$52,896
200600010020	Force Main #2 Piping	LF	228	$191.27	$43,609	20%	$8,722	1,4	$52,331
200600010030	Force Main #3 Piping	LF	228	$191.43	$43,647	20%	$8,729	1,4	$52,376
200600020	Surge Tanks								
200600020010	Surge Tanks	EA	6	$140,537.80	$843,227	20%	$168,645	1,4	$1,011,872
200600020020	Surge Tank Cradle	EA	12	$1,940.78	$23,289	20%	$4,658	1,4	$27,947
200600020030	Surge Tank Off-loading	EA	6	$1,884.99	$11,310	20%	$2,262	1,4	$13,572
200600020040	Surge Tank Installation	EA	6	$5,654.98	$33,930	20%	$6,786	1,4	$40,716
200600030	Electrical Power								
200600030010	Underground Power	LF	120	$26.91	$3,229	20%	$646	1,4	$3,875
200600030020	Connection	EA	2	$214.98	$430	20%	$86	1,4	$516
200700	**Electrical**				**$4,277,520**	**25%**	**$1,069,380**		**$5,346,900**
200700100	115 KV Power Line	EA	1	$1,670,000.00	$1,670,000	25%	$417,500	1,4	$2,087,500
200700120	Substation (Double Ended)	EA	1	$1,130,000.00	$1,130,000	25%	$282,500	1,4	$1,412,500

Devils Lake Outlet
Construction Cost Estimate Summary

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Pricing Date: Jul-02

13 PUMPING PLANT						Contingencies			Estimated
Reference No.	Description	Units	Quantity	Unit Cost	Total Cost	Percent	Amount	Reason	Total Cost
200700140	Pump Station Grounding System	EA	1	$20,000.00	$20,000	25%	$5,000	1,4	$25,000
200700160	Cabling to Medium Voltage S.G.	EA	2	$85,000.00	$170,000	25%	$42,500	1,4	$212,500
200700180	Med. Voltage Switchgear Sections	EA	8	$30,000.00	$240,000	25%	$60,000	1,4	$300,000
200700200	Synchronous Motor Auto. Starters	EA	3	$60,000.00	$180,000	25%	$45,000	1,4	$225,000
200700240	Cabling to Pump Motors	EA	3	$20,000.00	$60,000	25%	$15,000	1,4	$75,000
200700260	750 KVA 4160-277/480 V Transf.	EA	2	$40,000.00	$80,000	25%	$20,000	1,4	$100,000
200700280	4160 V Cabling to Transformer	EA	2	$10,000.00	$20,000	25%	$5,000	1,4	$25,000
200700300	480 V Cabling to MCCs	EA	2	$38,000.00	$76,000	25%	$19,000	1,4	$95,000
200700320	480 V MCC Sections w/ Start/Br.	EA	12	$6,000.00	$72,000	25%	$18,000	1,4	$90,000
200700340	100 HP VFDs	EA	2	$24,000.00	$48,000	25%	$12,000	1,4	$60,000
200700360	Station Equipment 480 V Motors	EA	40	$2,463.00	$98,520	25%	$24,630	1,4	$123,150
200700380	Cabling to 480V Sta. Loads/Motor	EA	60	$1,100.00	$66,000	25%	$16,500	1,4	$82,500
200700400	75 KVA 480-120/208 Volt Transfr.	EA	2	$4,000.00	$8,000	25%	$2,000	1,4	$10,000
200700420	120/208 Volt Panelboards	EA	2	$3,500.00	$7,000	25%	$1,750	1,4	$8,750
200700440	277/480 Volt Panelboards	EA	2	$5,000.00	$10,000	25%	$2,500	1,4	$12,500
200700500	Exterior Site Lighting	EA	1	$30,000.00	$30,000	25%	$7,500	1,4	$37,500
200700550	Interior Pump Station Lighting	EA	1	$30,000.00	$30,000	25%	$7,500	1,4	$37,500
200700600	Pump Station Control Panel	EA	1	$70,000.00	$70,000	25%	$17,500	1,4	$87,500
200700650	Pump Station Control Wiring	EA	60	$700.00	$42,000	25%	$10,500	1,4	$52,500
200700680	Pump Station Instrumentation	EA	1	$100,000.00	$100,000	25%	$25,000	1,4	$125,000
200700700	Misc. System Instrumentation	EA	1	$50,000.00	$50,000	25%	$12,500	1,4	$62,500
Pumps					$2,962,353		$592,471		$3,554,823
200300300100	Motors	EA	3	$323,568.14	$970,704	20%	$194,141	1,3,4	$1,164,845
200300300150	Pumps	EA	3	$663,882.77	$1,991,648	20%	$398,330	1,3,4	$2,389,978

Reason for Contingencies: Uncertainties in:	
1	Quantities
2	Site Conditions
3	Haul Distances
4	Unit Pricing

Opinion of Probable Constructed Cost
Sand Filtration for Devils Lake Outlet

Table 1

COST CODE	DESCRIPTION	MATERIAL UNIT	MATERIAL QTY	MATERIAL UNIT COST	MATERIAL SUB-TOTAL	LABOR UNIT HRS	LABOR HRS	LABOR RATE	LABOR SUB-TOTAL	SUB CONTRACT	TOTAL
	Summary										
Page 2	Bonds & Mobilization	LS			$375,000						$375,000
3	Site Work	LS			$2,220,000						$2,220,000
4	Structural	LS			$2,375,800						$2,375,800
5	Equipment	LS			$1,355,000						$1,355,000
6	Piping and Appurtenances	LS			$5,180,500						$5,180,500
7	Electrical and Controls	LS			$1,200,000						$1,200,000
	DIRECT COST				$12,706,300						$12,706,300
	CONSTRUCTION EQUIPMENT & INDIRECTS	LS									
	CONTRACTOR'S OVERHEAD & PROFIT	LS									
	FREIGHT	LS									
	SALES TAX -	%									
	SUB-TOTAL										$12,706,300
	ESTIMATE CONTINGENCY	%	15								$1,905,900
	SCOPE CONTINGENCY	%	30								$3,811,900
	SCOPE CONTINGENCY	%	-15								-$1,905,900
									TOTAL (+30% Scope Contingency)		$18,424,100

Opinion of Probable Constructed Cost
Sand Filtration for Devils Lake Outlet

Table 2

COST CODE	DESCRIPTION	MATERIAL UNIT	QTY	UNIT COST	SUB-TOTAL	LABOR UNIT HRS	LABOR HRS	RATE	SUB-TOTAL	SUB CONTRACT	TOTAL
	Bonds & Mobilization										
	Mobilization	1	LS	$250,000	$250,000						$250,000
	Bonds	1	LS	$75,000	$75,000						$75,000
	Insurance	1	LS	$50,000	$50,000						$50,000
	DIRECT COST				$375,000						$375,000
	CONSTRUCTION EQUIPMENT & INDIRECTS	LS									Included on
	CONTRACTOR'S OVERHEAD & PROFIT	LS									summary
	FREIGHT	LS									sheet
	SALES TAX -	%									
	SUB-TOTAL										$375,000
	CONTINGENCY	%									Included on
	ENGINEERING	LS									summary
	BOND	%									sheet
	TOTAL										$375,000

Opinion of Probable Constructed Cost
Sand Filtration for Devils Lake Outlet

Table 3

COST CODE	DESCRIPTION	MATERIAL UNIT	MATERIAL QTY	MATERIAL UNIT COST	MATERIAL SUB-TOTAL	LABOR UNIT HRS	LABOR LABOR HRS	LABOR RATE	LABOR SUB-TOTAL	SUB CONTRACT	TOTAL
	Site Work										
	Fill	CY	20,000	$20	$400,000						$400,000
	Restoration	LS	1	$10,000	$10,000						$10,000
	General Earthwork	LS	1	$250,000	$250,000						$250,000
	Sludge Drying Beds	SF	780,000	$2	$1,560,000						$1,560,000
	DIRECT COST				$2,220,000						$2,220,000
	CONSTRUCTION EQUIPMENT & INDIRECTS	LS									Included on
	CONTRACTOR'S OVERHEAD & PROFIT	LS									summary
	FREIGHT	LS									sheet
	SALES TAX -	%									
	SUB-TOTAL										$2,220,000
	CONTINGENCY	%									Included on
	ENGINEERING	LS									summary
	BOND	%									sheet
	TOTAL										$2,220,000

Opinion of Probable Constructed Cost
Sand Filtration for Devils Lake Outlet

Table 4

COST CODE	DESCRIPTION	MATERIAL UNIT	QTY	UNIT COST	SUB-TOTAL	LABOR UNIT HRS	LABOR HRS	RATE	SUB-TOTAL	SUB CONTRACT	TOTAL
	Structural										
	Concrete -Filtertanks										
	Walls	CY	1,200	$400	$480,000						$480,000
	Floors	CY	784	$200	$156,800						$156,800
	Control Building										
	Floor	CY	200	$200	$40,000						$40,000
	Building	SF	4,500	$30	$135,000						$135,000
	Concrete - Clearwell										
	Walls	CY	120	$400	$48,000						$48,000
	Floors	CY	80	$200	$16,000						$16,000
	Platform	CY	30	$400	$12,000						$12,000
	Clearwell Pump Building	SF	600	$30	$18,000						$18,000
	Clarifiers	LS	1	$1,200,000	$1,200,000						$1,200,000
	Sludge Pumping Building	LS	1	$30,000	$30,000						$30,000
	Sludge Drying Area Permiter Wall	CY	800	$300	$240,000						$240,000
	DIRECT COST				$2,375,800						$2,375,800
	CONSTRUCTION EQUIPMENT & INDIRECTS	LS									Included on
	CONTRACTOR'S OVERHEAD & PROFIT	LS									summary
	FREIGHT	LS									sheet
	SALES TAX -	%									
	SUB-TOTAL										$2,375,800
	CONTINGENCY	%									Included on
	ENGINEERING	LS									summary
	BOND	%									sheet
	TOTAL										$2,375,800

Opinion of Probable Constructed Cost
Sand Filtration for Devils Lake Outlet

Table 5

COST CODE	DESCRIPTION	MATERIAL UNIT	QTY	UNIT COST	SUB-TOTAL	LABOR UNIT HRS	LABOR HRS	RATE	SUB-TOTAL	SUB CONTRACT	TOTAL
	Equipment										
	Distribution headers	Cell	14	$10,000	$140,000						$140,000
	Underdrain system	Cell	14	$40,000	$560,000						$560,000
	Media	CY	3,500	$50	$175,000						$175,000
	Blower	EA	1	$20,000	$20,000						$20,000
	15,000 gpm Vertical Turbine Pumps and Motors	EA	4	$50,000	$200,000						$200,000
	Disinfection System	LS	1	$50,000	$50,000						$50,000
	Sludge Drying Media	Cy	9,000	$20	$180,000						$180,000
	Sludge Pumps	EA	2	$15,000	$30,000						$30,000
	DIRECT COST				$1,355,000						$1,355,000
	CONSTRUCTION EQUIPMENT & INDIRECTS	LS									Included on
	CONTRACTOR'S OVERHEAD & PROFIT	LS									summary
	FREIGHT	LS									sheet
	SALES TAX -	%									
	SUB-TOTAL										$1,355,000
	CONTINGENCY	%									Included on
	ENGINEERING	LS									summary
	BOND	%									sheet
	TOTAL										$1,355,000

Opinion of Probable Constructed Cost
Sand Filtration for Devils Lake Outlet

Table 6

COST CODE	DESCRIPTION	MATERIAL UNIT	QTY	UNIT COST	SUB-TOTAL	LABOR UNIT HRS	LABOR HRS	RATE	SUB-TOTAL	SUB CONTRACT	TOTAL
	Piping and Appurtenances										
	64" DIP	LF	1,000	$400	$400,000						$400,000
	42" DIP	LF	1,500	$175	$262,500						$262,500
	30" DIP	LF	1,400	$150	$210,000						$210,000
	24" DIP	LF	1,200	$100	$120,000						$120,000
	42" HDPE	LF	1,000	$400	$400,000						$400,000
	42" Control Valve	EA	14	$60,000	$840,000						$840,000
	30" Control Valve	EA	30	$45,000	$1,350,000						$1,350,000
	24" Control Valve	EA	28	$32,000	$896,000						$896,000
	30" Check Valve	EA	2	$60,000	$120,000						$120,000
	30" Mag Meter	EA	4	$40,000	$160,000						$160,000
	Tank Connections	EA	50	$5,000	$250,000						$250,000
	Miscellaneous Fittings	LS	1	$10,000	$10,000						$10,000
	Sludge Drying Drain Tiles	LF	81,000	$2	$162,000						$162,000
	DIRECT COST				$5,180,500						$5,180,500
	CONSTRUCTION EQUIPMENT & INDIRECTS	LS									Included on
	CONTRACTOR'S OVERHEAD & PROFIT	LS									summary
	FREIGHT	LS									sheet
	SALES TAX -	%									
	SUB-TOTAL										$5,180,500
	CONTINGENCY	%									Included on
	ENGINEERING	LS									summary
	BOND	%									sheet
	TOTAL										$5,180,500

Opinion of Probable Constructed Cost
Sand Filtration for Devils Lake Outlet

Table 7

COST CODE	DESCRIPTION	MATERIAL UNIT	QTY	UNIT COST	SUB-TOTAL	LABOR UNIT HRS	LABOR HRS	RATE	SUB-TOTAL	SUB CONTRACT	TOTAL
	Electrical and Controls	1	LS	$1,200,000	$1,200,000						$1,200,000
	DIRECT COST				$1,200,000						$1,200,000
	CONSTRUCTION EQUIPMENT & INDIRECTS	LS									Included on
	CONTRACTOR'S OVERHEAD & PROFIT	LS									summary
	FREIGHT	LS									sheet
	SALES TAX -	%									
	SUB-TOTAL										$1,200,000
	CONTINGENCY	%									Included on
	ENGINEERING	LS									summary
	BOND	%									sheet
	TOTAL										$1,200,000

18 Cultural Resources Preservation

18 CULTURAL RESOURCES PRESERVATION
DEVILS LAKE OUTLET
SHEYENNE RIVER BANK STABILIZATION

Design Assumptions

54 Sites
500 Feet Long
14 Feet High, Average
25% of the sites are to be cut back from vertical to 1 on 3
18 Inch Riprap Thickness
9 Inch Bedding Thickness
33% Existing Slope
44 Feet, Slope Length
25% of the sites require clearing and grubbing

Per Site:

1,220 CY Riprap
610 CY Bedding
1,360 CY Excavation (25% of the sites)
130 LF Clearing & Grubbing

All Sites:

65,880 CY Riprap
32,940 CY Bedding
73,440 CY Excavation (25% of the sites)
7,020 LF Clearing & Grubbing

Cost Estimate, All Sites:

Item Description	Quantity	Unit	Unit Price	Amount	Contingency Percent	Contingency Amount	Total
Riprap	65,880	CY	57.00	3,760,000	50%	1,880,000	5,640,000
Bedding	32,940	CY	38.00	1,250,000	50%	630,000	1,880,000
Excavation (25% of the sites)	73,440	CY	5.00	370,000	100%	370,000	740,000
Clearing & Grubbing	7,020	LF	25.00	180,000	100%	180,000	360,000
Total Estimated Construction Amount				5,560,000		3,060,000	8,620,000
Engineering & Design	15%						1,290,000
Supervision & Administration	7%						600,000
Cultural Resources	54	Sites	2,000	108,000	100%	108,000	220,000
Real Estate	54	Sites	2,000	108,000	100%	108,000	220,000
				5,776,000	56.72%	3,276,000	10,950,000

Total Estimated Amount	(rounded)	11,000,000
Total Estimated Amount per Site	(rounded)	200,000

See riprap analysis prepared for Dave Loss, 3/28/01.
Based on riprap @ $38/ton x 1.5 ton/cy and bedding @ $25/ton x 1.5 ton/cy.

	Amt	Cont	Cont %	Amt W/ Cont
Within 1% of Federal Costs	**778,000**	**442,000**	56.72%	**1,220,000**
Over 1% of Federal costs	**6,240,000**	**3,540,000**	56.72%	**9,780,000**
				11,000,000

Table 5
Dry Lake Diversion
Project Cost Estimate Summary

Estimated Construction Cost (Includes Contingencies)	**$2,673,700**
Engineering and Design (25% of Construction Cost)	$668,400
Construction Engineering, Supervision, and Admin. (7.5% of Construction Cost)	$200,500
Environmental Mitigation [a]	**$1,015,100**
Cultural Resources Survey [b]	**$2,866,000**
Real Estate [c]	$2,494,000
Total Estimated First Costs	**$9,917,700**

Annual Cost of Estimated Total First Costs	$662,400
Term: 50 years	
Interest Rate: 6.375%	
Annual Operation and Maintenance Cost	$32,500

Total Est. Annual Cost	**$694,900**

[a] Includes $1,000,000 for Lake Alice National Wildlife Refuge compatibility compliance. Costs provided by St. Paul District Corps of Engineers.

[b] Costs are for surveys only. Does not include possible future costs for cultural resources site evaluation and mitigation. Costs provided by St. Paul District Corps of Engineers.

[c] Includes all real estate costs. Includes administration costs for acquisition. Costs provided by St. Paul District Corps of Engineers.

DEVILS LAKE , NORTH DAKOTA

1/22/2003

($000's)

A	B	C	D	E	F	G
	Formulation Estimate (2/02)	First Costs (65/35)	Current Estimate (12/02) Adaptive Mgmt.Costs (65/35) Ann'l.Amt.	No.of Years	Total	Annual Non-Fed.
01 - LANDS & DAMAGES						
Outlet	$978.0	$985.0				
Dry Lake Diversion		$2,494.0				
D.S.Flowage Easements		$3,810.0				
Lowhead Dams on Shey. River		$40.0				
Operational Real Estate Issues						[1]
02 - RELOCATIONS						
Cost Shared						
Non-Federal						
06 - FISH AND WILDLIFE						
Envir.Mitig. (Outlet)		$94.0				
Envir.Mitig. (Dry Lake)		$1,000.0				
Envir.Mitig. (Downstream)	$3,900.0					
Terrestrial		$7,238.0	$50.0	10	$500.0	[2]
Cutoffs/Meanders		$9,000.0	$50.0	10	$500.0	[2]
Erosion Protection		$8,660.0	$200.0	10	$2,000.0	[2]
Monitoring						
Water Quality		$640.3	$93.3	10	$933.0	[2]
Groundwater/Salinity		$543.0	$55.9	10	$559.0	[2]
Erosion/Sediment		$304.3	$25.8	10	$258.0	[2]
Aquatic Habitat		$333.3	$31.1	10	$311.0	[2]
Aquatic/Invasive Species		$1,001.7	$127.4	10	$1,274.0	[2]
Riparian Habitat		$369.0	$31.7	10	$317.0	[2]
09 - CHANNELS						
Gravity Pipeline	$12,053.0	$14,157.0				
Pressure Pipeline & Reservoir	$33,837.0	$30,276.0				
Inlet Channel	$9,896.0	$7,324.0				
Dry Lake Diversion	$1,246.0	$2,674.0				
Lowhead Dams on Shey. River		$1,815.0				
13 - PUMPING PLANTS						
Pumps and Motors	$3,585.0	$3,594.0				
Pump Station and Controls	$13,384.0	$13,421.0				
Sand Filter		$18,424.0				$950.0
18 - CULT. RES. PRESERV.						
Within 1% of Federal Costs	$700.0	$1,220.0				
Over 1% of Federal Costs	$9,300.0	$9,696.0				
Dry Lake Diversion Surveys		$2,900.0				
Monitoring			$29.6	10	$296.0	
Potential Future Mitigation Needs			[3]			
30 - ENGINEERING AND DESIGN						
General Investigations (PED)		$10,300.0				
Construction General Funding	$4,332.0	$18,948.0				
31 - SUPERV. & ADMINIST. (7%)	$4,440.0	$8,237.0				
OPERATION & MAINTENANCE						
Outlet Operation						$1,763.0
Additional DS Water Treatment						$50.6
O&M of Misc. Project Features						$200.0
TOTAL	$97,651.0	$179,498.6	$694.8		$6,948.0	$2,963.6

Total First Costs are a Combination of Columns C and F: $186,446.6

[1] Non-Federal sponsor responsible for unidentified, but potential future real estate costs.
[2] Costs after 10th year to be borne by non-federal sponsor. Amount dependent on need for outlet operation.
[3] Potential identification of additional cultural sites requiring mitigation to be cost shared.

30 - ENGINEERING AND DESIGN							
CONSTRUCTION GENERAL FUNDING						Approx.	
06 - FISH AND WILDLIFE	Feature	ED Ratio	Amount	Conting	Total	Contingency	Comments/Assumptions
Envir.Mitig. (Outlet)	$ 94	27%	$ 20	$ 6	$ 25	30%	Find Land, Contract for fencing and management
Envir.Mitig. (Dry Lake)	$ 1,000	27%	$ 208	$ 62	$ 270	30%	Develop channels and embankments for mitigation
Envir.Mitig. (Downstream)							
Terrestrial	$ 7,238	27%	$ 1,503	$ 451	$ 1,954	30%	Find Lands, Management Plan
Cutoffs/Meanders	$ 9,000	27%	$ 1,869	$ 561	$ 2,430	30%	
Erosion Protection	$ 8,660	27%	$ 1,799	$ 540	$ 2,338	30%	
09 - CHANNELS			$ -	$ -	$ -		
Gravity Pipeline	$ 14,157	7%	$ 826	$ 165	$ 991	20%	Mostly Designed
Pressure Pipeline & Reservoir	$ 30,276	7%	$ 1,759	$ 361	$ 2,119	20.5%	Mostly Designed, need mapping
Inlet Channel	$ 7,324	7%	$ 404	$ 109	$ 513	27%	Mostly Designed, need mapping
Dry Lake Diversion	$ 2,674	27%	$ 531	$ 191	$ 722	36%	Current Design is only conceptual. Need base information
Lowhead Dams on Shey. River	$ 1,815	27%	$ 327	$ 163	$ 490	50%	Current Design is extremely conceptual
13 - PUMPING PLANTS	$ -		$ -	$ -	$ -		
Pumps and Motors	$ 3,594	3%	$ 90	$ 18	$ 108	20%	P&S essentially complete.
Pump Station and Controls	$ 13,421	15%	$ 1,650	$ 363	$ 2,013	22%	Design is about 50% complete
Sand Filter	$ 18,424	27%	$ 3,431	$ 1,544	$ 4,974	45%	
SUM			**14,415**	**4,533**	**$ 18,948**		

Note: E&D Ratio includes 2% for engineering during construction for all items

DEVILS LAKE , NORTH DAKOTA

1/22/2003

($000's)

A	B	C	D	E	F	G
	Formulation Estimate (2/02)	First Costs (65/35)	Current Estimate (12/02) Adaptive Mgmt.Costs (65/35) Ann'l.Amt.	No.of Years	Total	Annual Non-Fed.
01 - LANDS & DAMAGES						
Outlet	$978.0	$985.0				
Dry Lake Diversion		$2,494.0				
D.S.Flowage Easements		$3,810.0				
Lowhead Dams on Shey. River		$40.0				
Operational Real Estate Issues						[1]
02 - RELOCATIONS						
Cost Shared						
Non-Federal						
06 - FISH AND WILDLIFE						
Envir.Mitig. (Outlet)		$94.0				
Envir.Mitig. (Dry Lake)		$1,000.0				
Envir.Mitig. (Downstream)	$3,900.0					
Terrestrial		$7,238.0	$50.0	10	$500.0	[2]
Cutoffs/Meanders		$9,000.0	$50.0	10	$500.0	[2]
Erosion Protection		$8,660.0	$200.0	10	$2,000.0	[2]
Monitoring						
Water Quality		$640.3	$93.3	10	$933.0	[2]
Groundwater/Salinity		$543.0	$55.9	10	$559.0	[2]
Erosion/Sediment		$304.3	$25.8	10	$258.0	[2]
Aquatic Habitat		$333.3	$31.1	10	$311.0	[2]
Aquatic/Invasive Species		$1,001.7	$127.4	10	$1,274.0	[2]
Riparian Habitat		$369.0	$31.7	10	$317.0	[2]
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13 - PUMPING PLANTS						
Pumps and Motors	$3,585.0	$3,594.0				
Pump Station and Controls	$13,384.0	$13,421.0				
Sand Filter		$18,424.0				$950.0
18 - CULT. RES. PRESERV.						
Within 1% of Federal Costs	$700.0	$1,220.0				
Over 1% of Federal Costs	$9,300.0	$9,696.0				
Dry Lake Diversion Surveys		$2,900.0				
Monitoring			$29.6	10	$296.0	
Potential Future Mitigation Needs			[3]			
30 - ENGINEERING AND DESIGN						
General Investigations (PED)		$10,300.0				
Construction General Funding	$4,332.0	$18,948.0				
31 - SUPERV. & ADMINIST. (7%)	$4,440.0	$8,237.0				
OPERATION & MAINTENANCE						
Outlet Operation						$1,763.0
Additional DS Water Treatment						$50.6
O&M of Misc. Project Features						$200.0
TOTAL	$97,651.0	$179,498.6	$694.8		$6,948.0	$2,963.6

Total First Costs are a Combination of Columns C and F: $186,446.6

[1] Non-Federal sponsor responsible for unidentified, but potential future real estate costs.
[2] Costs after 10th year to be borne by non-federal sponsor. Amount dependent on need for outlet operation.
[3] Potential identification of additional cultural sites requiring mitigation to be cost shared.

CONSTRUCTION SUPERVISION AND ADMINISTRATION							
	% Conting	S&A Ratio				Approx.	
06 - FISH AND WILDLIFE			Amt	Cont	Total	Contingency	
Envir.Mitig. (Outlet)	$ 94	7%	$ 5	$ 2	$ 7	30%	
Envir.Mitig. (Dry Lake)	$ 1,000	7%	$ 54	$ 16	$ 70	30%	Construct fencing or small earthworks
Envir.Mitig. (Downstream)							
Terrestrial	$ 7,238	7%	$ 390	$ 117	$ 507	30%	Construct fencing or small earthworks
Cutoffs/Meanders	$ 9,000	7%	$ 485	$ 145	$ 630	30%	Construction of channels and embankments
Erosion Protection	$ 8,660	7%	$ 466	$ 140	$ 606	30%	Constuction of Embankments, Control Structures, etc.
09 - CHANNELS			$ -	$ -			
Gravity Pipeline	$ 14,157	7%	$ 826	$ 165	$ 991	20%	
Pressure Pipeline & Reservoir	$ 30,276	7%	$ 1,759	$ 361	$ 2,119	20.5%	
Inlet Channel	$ 7,324	7%	$ 404	$ 109	$ 513	27%	
Dry Lake Diversion	$ 2,674	7%	$ 138	$ 50	$ 187	36%	
Lowhead Dams on Shey. River	$ 1,815	7%	$ 85	$ 42	$ 127	50%	
13 - PUMPING PLANTS			$ -	$ -			
Pumps and Motors	$ 3,594	7%	$ 210	$ 42	$ 252	20%	
Pump Station and Controls	$ 13,421	7%	$ 770	$ 169	$ 939	22%	
Sand Filter	$ 18,424	7%	$ 889	$ 400	$ 1,290	45%	
SUM			**6,479**	**1,758**	**$ 8,237**		

Project Operations and Maintenance Estimate

Operation and Maintenance
Feasibility Estimate

Project: Devils Lake Outlet
Life Cycle: 50 Years
Rate of Return: 6.625%

Account Code	Item Description	O&M and Major Replacement Costs							Equivalent Average Annual O&M Costs		Comments
		Estimated O&M Cycle	Quantity Factor	Project Quantity	O&M Quantity	Unit	Unit price	Amount	Present Value	Annual Cost	
100	**Open Channel**										
100.200	**Site Work**										
	Periodic Site Inspection	5 Yrs	1	1	1	LS	$5,000.00	$5,000	$12,687	$876	Inspect every 5 years, 2 day inspection, crew: 2 inspectors, vehicle
	Clear Vegetation from Channel Bottom	5 Yrs	1	1	1	LS	$6,000.00	$6,000	$15,225	$1,051	Clear trees every 5 years, crew with tractor/tiller for 1 week
100.300	**Road Crossings**										
100.300.100	Sta 1034+90 Hwy 281										
100.300.100.650	Cleanout Box Culverts	1 Yrs	1	1	1	LS	$6,000.00	$6,000	$86,902	$6,000	Culvert Cleanout - Crew of 2 for 1 week to clean out/ repair culverts
	Concrete Repair on Box Culverts	20 Yrs	0.1	9,360	936	SF	$13.85	$12,964	$4,771	$329	Surface repair portion of wall
100.300.100.800	Riprap	10 Yrs	0.2	267	53	CY	$112.00	$5,981	$6,382	$441	Replace riprap material periodically
100.300.100.850	Filter Material	10 Yrs	0.2	135	27	CY	$47.00	$1,269	$1,354	$93	Replace filter material periodically
100.300.200	Sta 866+00										
100.300.200.650	Cleanout Box Culverts	1 Yrs	1	1	1	LS	$6,000.00	$6,000	$86,902	$6,000	Culvert Cleanout - Crew of 2 for 1 week to clean out/ repair culverts
	Concrete Repair on Box Culverts	20 Yrs	0.1	9,360	936	SF	$13.85	$12,964	$4,771	$329	Surface repair portion of wall
100.400	**Culvert Plugging**										
100.400.100	Large Diameter	20 Yrs	1	1	1	LS	$5,000.00	$5,000	$1,840	$127	Replug any leaks in the culverts
100.400.200	Small Diameter	20 Yrs	1	1	1	LS	$2,000.00	$2,000	$736	$51	Replug any leaks in the culverts
100.500	**Road Raise**										
100.500.100	Riprap	10 Yrs	0.2	124,000	24,800	CY	$112.00	$2,777,600	$2,963,697	$204,624	Replace riprap material periodically
100.500.300	Concrete Wall	20 Yrs	0.1	14,400	1,440	SF	$13.85	$19,944	$7,340	$507	Surface repair portion of wall
100.500.400	Filter Material	5 Yrs	0.2	78,667	15,733	CY	$47.00	$739,470	$1,876,390	$129,553	Replace filter material periodically
200	**Pump Station**										
200.200	**Civil/Site Layout**										
200.200.200	Intake Channel Excavation	10 Yrs	1	1	1	LS	$15,000.00	$15,000	$16,005	$1,105	Dredge Intake Channel - Assume crane and clam bucket and crewfor 1 week
200.200.350	Retaining Walls	20 Yrs	0.1	5,475	548	SF	$13.85	$7,583	$2,791	$193	Surface repair portion of wall
200.200.400	Wingwalls	20 Yrs	0.1	5,900	590	SF	$13.85	$8,172	$3,007	$208	Surface repair portion of wall
200.200.650	Sanitary Facility	10 Yrs	1	1	1.00	LS	$5,000.00	$5,000	$5,335	$368	Lump Sum Periodic Maintenance Cost
200.200.700	Potable Water Well	10 Yrs	1	1	1.00	LS	$10,000.00	$10,000	$10,670	$737	Lump Sum Periodic Maintenance Cost
200.200.750	Water Sampling Equipment	10 Yrs	1	1	1.00	LS	$1,000.00	$1,000	$1,067	$74	Lump Sum Periodic Maintenance Cost
200.200.800	Telemetry Equipment	10 Yrs	1	1	1.00	LS	$5,000.00	$5,000	$5,335	$368	Lump Sum Periodic Maintenance Cost
	Periodic Site Inspection	5 Yrs	1	1	1	LS	$5,000.00	$5,000	$12,687	$876	Inspect every 5 years, 2 day inspection, crew: 2 inspectors, vehicle
	Mowing	0.25 Yrs	1		0	ACR	$1,895.00	$0	$0	$0	Assume mowing 4/year
200.300	**Pump Station and Motor Control**										
200.300.100	**Substructure**										
200.300.100.100	Concrete Repair	20 Yrs	0.1	28,529	2,853	SF	$13.85	$39,513	$14,542	$1,004	Concrete Surface Repair
200.300.100.550	Forebay										
200.300.100.550.10	Grating Framing	25 Yrs	1	1	1	LS	$2,000.00	$2,000	$483	$33	Lump Sum Periodic Repairs
200.300.100.550.30	Grating	10 Yrs	1	20	20	SF	$8.23	$165	$176	$12	Replace 2 sections periodically
200.300.100.550.40	Handrail	20 Yrs	1	5	5	LF	$16.21	$81	$30	$2	Replace 5' every 20 years
200.300.100.550.50	Vehicle Barriers	20 Yrs	1	5	5	LF	$107.00	$535	$197	$14	Replace 5' every 20 years
200.300.200	**Superstructure**										
200.300.200.100	Slab on Grade - Concrete Repair	20 Yrs	0.1	4,000	400	SF	$13.85	$5,540	$2,039	$141	Concrete Surface Repair
	Paint Floor Slab	5 Yrs	1	4,000	4,000	SF	$0.50	$2,000	$5,075	$350	Repaint floor periodically
200.300.200.200	Steel Braced Framed Building										
	Reroof Building	25 Yrs	1	4,000	4,000	LS	$3.50	$14,000	$3,383	$234	Repalce roof with new corrugated metal roof
	Repaint Doors/ Miscellaneous Items	10 Yrs	1	1	1	LS	$6,000.00	$6,000	$6,402	$442	Assume 2 painters for 1 week, plus $2000 in paint/materials
	Repaint MCC Room	20 Yrs	1	1	1	LS	$6,000.00	$6,000	$2,208	$152	Assume 2 painters for 1 week, plus $2000 in paint/materials
	Annual Building Maintenance	1 Yrs	1	1	1	LS	$2,000.00	$2,000	$28,967	$2,000	Assume 1 worker for 1 week, plus $400 supplies
200.300.300	**Pumps, Motors, and Piping**										
200.300.300.100	Motors and Pumps - Operation	1 Yrs	1	1	1	EA	$1,178,000.00	$1,178,000	$17,061,671	$1,178,000	Median 50 year flow, see backup data
200.300.300.100	Motors - Maintenance (Major)	24 Yrs	1	3	3	EA	$100,000.00	$300,000	$78,597	$5,427	Includes recaging the motors, see "Cost Comparison of Flow Options" in backup comps
200.300.300.100	Motors - Maintenance (Secondary)	12 Yrs	1	3	3	EA	$38,000.00	$114,000	$94,358	$6,515	See "Cost Comparison of Flow Options" in backup comps

Operation and Maintenance
Feasibility Estimate

Project: Devils Lake Outlet
Life Cycle: 50 Years
Rate of Return: 6.625%

		O&M and Major Replacement Costs							Equivalent Average Annual O&M Costs		
Account Code	Item Description	Estimated O&M Cycle	Quantity Factor	Project Quantity	O&M Quantity	Unit	Unit price	Amount	Present Value	Annual Cost	Comments
200.300.300.150	Pumps - Maintenance	5 Yrs	1	3	3	EA	$15,000.00	$45,000	$114,187	$7,884	Assume crew w/ crane for 1 week every 5 years for each pump
200.300.300.200	Farval Lubricator	1 Yrs	1	1	1	EA	$1,200.00	$1,200	$17,380	$1,200	Assume cre wof 1, 4 hrs/month for 7 months out of the year
200.300.300.320	8" Air Relief Valve	25 Yrs	1	3	3	EA	$2,127.00	$6,381	$1,542	$106	Assume replacement at 25 years
	Maintenance on Air Relief Valve	10 Yrs	1	1	1	LS	$1,200.00	$1,200	$1,280	$88	Assume 1 crew of 2 and small tools work on them for 1 day
200.300.300.340	6" Air Release Valve	25 Yrs	1	3	3	EA	$3,106.00	$9,318	$2,251	$155	Assume replacement at 25 years
	Maintenance on Air Relief Valve	10 Yrs	1	1	1	LS	$1,200.00	$1,200	$1,280	$88	Assume 1 crew of 2 and small tools work on them for 1 day
200.300.300.350	42" Tlting Disc Check Valve	25 Yrs	1	3	3	EA	$552,263.00	$1,656,789	$400,303	$27,638	Assume replacement at 25 years
200.300.300.360	42" Cone Valve - Maintenance	10 Yrs	1	1	1	LS	$16,000.00	$16,000	$17,072	$1,179	Assume 1 crew (with crane) for 1 week every 10 years
200.300.300.380	42" Butterfly Valve	25 Yrs	1	3	3	EA	$214,528.00	$643,584	$155,499	$10,736	Assume replacement at 25 years
200.300.300.400	Pipes/Fittings	10 Yrs	1	1	1	LS	$5,000.00	$5,000	$5,335	$368	Assume 2 painters for 1 week, plus $1800 in paint/supplies
200.300.400	**HVAC**										
200.300.400	HVAC - Operation	1 Yrs	1	1	1	LS	$6,280.00	$6,280	$90,957	$6,280	Annual operating cost for electric unit heaters
200.300.400	HVAC - Maintenance	1 Yrs	1	1	1	LS	$1,000.00	$1,000	$14,484	$1,000	Annual maintenance cost for HVAC equipment
200.300.400	HVAC - Equipment Replacement Cost	15 Yrs	1	1	1	LS	$53,000.00	$53,000	$31,441	$2,171	Assume equipment is replaced every 15 years
200.300.500	**Fish Screens**										
200.300.500.200	Frames	20 Yrs	1	1	1	LS	$5,000.00	$5,000	$1,840	$127	Assume crew of 2, small crane for 3 days plus materials to make repairs
200.300.500.300	Fish Screens	5 Yrs	1	1	1	EA	$1,200.00	$1,200	$3,045	$210	Assume crew of 2 for 1 day every 5 years for repairs/maintenance
200.300.500.400	Screen Panel Framing	20 Yrs	1	1	1	LS	$5,000.00	$5,000	$1,840	$127	Assume crew of 2, small crane for 3 days plus materials to make repairs
200.300.600	**Trash Racks and Rakes**										
200.300.600.100	Trash Racks	10 Yrs	1	1	1	LS	$5,000.00	$5,000	$5,335	$368	Assume crew of 2, equipment for 3 days
200.300.600.200	Trash Rack Support Frame	10 Yrs	1	1	1	LS	$5,000.00	$5,000	$5,335	$368	Assume crew of 2, equipment for 3 days
200.300.600.300	Trashraking System	5 Yrs	1	1	1	LS	$5,000.00	$5,000	$12,687	$876	Assume crew of 2, equipment for 3 days
200.300.700	**Slide Gates**										
200.300.700.100	Slide Gates	20 Yrs	1	1	1	LS	$14,000.00	$14,000	$5,152	$356	Repaint/repair gates - crew of 2 for 3 weeks, plus equipment and supplies
200.400	**Meter Vault**										
200.400.100	Concrete Structure										
200.400.100.100	Base Slab	20 Yrs	0.1	817	82	SF	$13.85	$1,132	$416	$29	Concrete Surface Repair
200.400.100.200	Walls	20 Yrs	0.1	2,418	242	SF	$13.85	$3,349	$1,232	$85	Concrete Surface Repair
200.400.100.300	Top Slab	20 Yrs	0.1	340	34	SF	$13.85	$471	$173	$12	Concrete Surface Repair
200.400.200	Piping										
200.400.200.200	Accusonic Flow Meter										
	Recalibration	5 Yrs	1	1	1	LS	$800.00	$800	$2,030	$140	Assume expert spends 1 day to recailbrate ($100/hr)
	Replace Transducer	10 Yrs	1	1	1	LS	$2,000.00	$2,000	$2,134	$147	
200.400.200.300	Sump Pump	20 Yrs	1	1	1	LS	$778.00	$778	$286	$20	Replace pump after 20 years
200.500	**Fill/Pump Bay and Drains**										
200.500.100	Valve Vault										
200.500.100.100	Base Slab	20 Yrs	0.1	441	44	SF	$13.85	$611	$225	$16	Concrete Surface Repair
200.500.100.200	Walls	20 Yrs	0.1	1,380	138	SF	$13.85	$1,911	$703	$49	Concrete Surface Repair
200.500.100.300	Top Slab	20 Yrs	0.1	144	14.4	SF	$13.85	$199	$73	$5	Concrete Surface Repair
200.500.200	Manhole										
200.500.200.100	8' Diameter Manhole	20 Yrs	0.1	1,230	123	SF	$13.85	$1,704	$627	$43	Concrete Surface Repair
200.500.200.200	Base Slab	20 Yrs	0.1	50	5	SF	$13.85	$69	$25	$2	Concrete Surface Repair
200.500.200.300	Top Slab	20 Yrs	0.1	50	5	SF	$13.85	$69	$25	$2	Concrete Surface Repair
200.500.300	Piping										
200.500.300.100	6" Butterfly Valve	25 Yrs	1	3	3	EA	$564.00	$1,692	$409	$28	Assume replacement at 25 years
200.500.300.200	8" Check Valve	25 Yrs	1	2	2	EA	$1,927.00	$3,854	$931	$64	Assume replacement at 25 years
200.500.300.300	8" Plug Valve	25 Yrs	1	2	2	EA	$1,064.00	$2,128	$514	$35	Assume replacement at 25 years
200.500.300.400	10" Butterfly Valve	25 Yrs	1	2	2	EA	$1,079.00	$2,158	$521	$36	Assume replacement at 25 years
200.600	**Surge Tanks**										
200.600.100	Piping										
200.600.200	Surge Tanks										
	Weekly Inspection	0.036 Yrs	1	1	1	LS	$40.00	$40	$16,601	$1,146	Inspect weekly, 1 hr/week for 7 months during operation
	Monthly Inspection	0.142 Yrs	1	1	1	LS	$40.00	$40	$4,194	$290	Inspect monthly, 1 hr/month for 7 months during operation
	Quarterly Inspection	0.25 Yrs	1	1	1	LS	$160.00	$160	$9,497	$656	Inspect quarterly, 4 hr/quarter
	Annual Inspection	1 Yrs	1	1	1	LS	$3,200.00	$3,200	$46,347	$3,200	Assume a crew of 2 spends 1 week

Operation and Maintenance
Feasibility Estimate

Project: Devils Lake Outlet
Life Cycle: 50 Years
Rate of Return: 6.625%

		O&M and Major Replacement Costs							Equivalent Average Annual O&M Costs		
Account Code	Item Description	Estimated O&M Cycle	Quantity Factor	Project Quantity	O&M Quantity	Unit	Unit price	Amount	Present Value	Annual Cost	Comments
	Paint Tanks/Maintenance	20 Yrs	1	1	1	LS	$25,000.00	$25,000	$9,201	$635	Assume crew of 2 painters, plus equipment and materials for 3 weeks
200.600.200.020	Surge Tank Cradles (Concrete)	20 Yrs	0.1	764	76	SF	$13.85	$1,058	$389	$27	Concrete Surface Repair
200.700	**Electrical**										
	Electrical - Operation	1 Yrs	1	1	1	LS	$26,230.00	$26,230	$379,905	$26,230	Electricity costs $117.10/day, assumed duration is 8 months
	Electrical - Inspection	1 Yrs	1	1	1	LS	$63,800.00	$63,800	$924,053	$63,800	Annual inspection cost - see backup data
	Electrical - Maintenance	1 Yrs	1	1	1	LS	$23,560.00	$23,560	$341,233	$23,560	Annual maintenance cost - see backup data
	Electrical - 10 Year Replacement	10 Yrs	1	1	1	LS	$100,000.00	$100,000	$106,700	$7,367	10 year replacement cost - see backup data
	Electrical - 25 Year Replacement	25 Yrs	1	1	1	LS	$510,000.00	$510,000	$123,223	$8,508	25 year replacement cost - see backup data
300	**Pipeline**										
	Inspect Entire Pipeline - Driving it	0.583 Yrs	1	1	1	LS	$700.00	$700	$17,626	$1,217	Drive Pipeline 1/month for the 7 months of operation
	Inspect Entire Pipeline - Televised	3 Yrs	1	1	1	LS	$12,500.00	$12,500	$56,521	$3,902	Televise pipeline inspection every 3 years
300.200	**Station 782+70 - 599+88**										
300.200.100	48" DIP	10 Yrs	1	40	40	LF	$850.00	$34,000	$36,278	$2,505	Assume 2 sections of pipe are replaced, $850/ft includes excavation, pipel, backfill
300.200.200	DIP Vacuum Relief Manholes										8 manholes
300.200.200.100	Concrete Surface Repair	20 Yrs	0.1	24,864	2,486	SF	$13.85	$34,437	$12,673	$875	Concrete Surface Repair (for all 8 structures)
300.200.200.200	Piping Maintenance/Repairs	5 Yrs	1	1	1	LS	$1,200.00	$1,200	$3,045	$210	Crew of two for 1 day for 1 structure every 5 years
30020025030010	Pump-Out Sump	EA 1									
3002002503001001	Installation	EA 1									
3002002503001002	Materials	EA 1									
30020025030020	Clear Rock - 1/4"	CY 61									
	Replace Butterfly Valve	25 Yrs	1	8	8	EA	$4,440.00	$35,520	$8,582	$593	Assume replacement at 25 years
300.200.400	Pump-Out Structures										2 structures
30020040007520	Excavation										
30020040007530	Backfill - Placement										
30020040007540	Backfill - Compaction										
300.200.400.100	Concrete Surface Repair	20 Yrs	0.1	3,642	364	SF	$13.85	$5,044	$1,856	$128	Concrete Surface Repair (for 2 structures)
30020040010010	Piping Maintenance/Repairs	5 Yrs	1	1	1	LS	$1,200.00	$1,200	$3,045	$210	Crew of two for 1 day for 1 structure every 5 years
300.200.400.200	Piping Maintenance/Repairs	10 Yrs	1	1	1	LS	$1,200.00	$1,200	$1,280	$88	Crew of two for 1 day for 1 structure every 10 years
	Replace Gate Valve	25 Yrs	1	2	2	EA	$1,500.00	$3,000	$725	$50	Assume replacement at 25 years
	Replace Submersible Pump	25 Yrs	1	2	2	EA	$41,000.00	$82,000	$19,812	$1,368	Assume replacement at 25 years
	Replace Backflow Valve	25 Yrs	1	2	2	EA	$12,400.00	$24,800	$5,992	$414	Assume replacement at 25 years
300.200.500	Road/Railroad Crossings	25 Yrs	1	1	1	EA	$4,442.00	$4,442	$1,073	$74	Assume replacement at 25 years
300.200.500.100	Fix leaky pipe under roadway	25 Yrs	1	1	1	LS	$3,600.00	$3,600	$870	$60	Assume once for entire pipeline, a break under asphalt road, cost is same as constructior
300.200.700	DIP/RCPP Transition Manifold Str										
300.200.700 .10	Concrete Repair	20 Yrs	0.1	1,120	112	SF	$13.85	$1,551	$571	$39	Concrete Surface Repair
300.200.800	Valve Vault										
300.200.800.100	Concrete Surface Repair	20 Yrs	0.1	7,912	791	SF	$13.85	$10,958	$4,033	$278	Concrete Surface Repair
300.200.800.200	Piping Maintenance/Repairs	5 Yrs	1	1	1	LS	$1,200.00	$1,200	$3,045	$210	Crew of two for 1 day every 5 years
300.300.200	RCPP Vacuum Relief										5 structures
300.300.200.150	Concrete Surface Repair	20 Yrs	0.1	3,265	327	SF	$13.85	$4,522	$1,664	$115	Concrete Surface Repair for all 5 structures
300.300.200.250	Piping Maintenance/Repairs	5 Yrs	1	1	1	LS	$1,200.00	$1,200	$3,045	$210	Crew of two for 1 day every 5 years (covers all 5 structures)
	Replace Butterfly Valve	25 Yrs	1	5	5	EA	$2,065.00	$10,325	$2,495	$172	Assume replacement at 25 years
	Replace Vacuum Release Valve	25 Yrs	1	5	5	EA	$9,165.00	$45,825	$11,072	$764	Assume replacement at 25 years
300.300.500	Reservoir										
300.300.500.100	Remove Brush	5 Yrs	1		0	ACR	$400.00	$0	$0	$0	Clear trees. Means 02230-220-1040
	Mowing	0.25 Yrs	1		0	ACR	$1,895.00	$0	$0	$0	Assume mowing 1/year
300.300.500.200.10	Box Culvert - Concrete Surface Repair	20 Yrs	0.1	720	72	SF	$13.85	$997	$367	$25	Concrete Surface Repair
300300500300	Control Structure - Concrete Surface Repair	20 Yrs	0.1		0	SF	$13.85	$0	$0	$0	Concrete Surface Repair
300.400	**Station 352+90 - 315+00**										
300.400.100	84" RCPP	10 Yrs	1	20	20	LF	$530.00	$10,600	$11,310	$781	Assume 1 section of pipe is replaced, $530/ft includes excavation, pipel, backfill
300.400.300	Manhole Air Release -Maintenance/Repairs	5 Yrs	1	1	1	LS	$1,200.00	$1,200	$3,045	$210	Crew of two for 1 day every 5 years (covers all 5 structures)
300.500	**Station 315+00 - 0+00**										
300.500.100	84" RCPP	10 Yrs	1	20	20	LF	$500.00	$10,000	$10,670	$737	Assume 1 section of pipe is replaced, $530/ft includes excavation, pipel, backfill
300.500.200	72"to 84" RCPP Transition MH	5 Yrs	1	1	1	LS	$1,200.00	$1,200	$3,045	$210	Crew of two for 1 day every 5 years
300.500.300	72" RCPP	10 Yrs	1	20	20	LF	$480.00	$9,600	$10,243	$707	Assume 1 section of pipe is replaced, $530/ft includes excavation, pipel, backfill
300.500.400	66" to 72" RCPP Transition MH	5 Yrs	1	1	1	LS	$1,200.00	$1,200	$3,045	$210	Crew of two for 1 day every 5 years
300.500.500	66" RCPP	10 Yrs	1	20	20	LF	$480.00	$9,600	$10,243	$707	Assume 1 section of pipe is replaced, $530/ft includes excavation, pipel, backfill

Operation and Maintenance
Feasibility Estimate

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		O&M and Major Replacement Costs							Equivalent Average Annual O&M Costs		
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300.500.625	Manhole Air Release -Maintenance/Repairs	5 Yrs	1	1	1	LS	$2,400.00	$2,400	$6,090	$420	Crew of two for 2 day every 5 years (covers all 11 structures)
300.500.900	SPPA Energy Dissipator										
300.500.900.200	Bulkhead - Concrete Surface Repair	20 Yrs	0.1	800	80	SF	$13.85	$1,108	$408	$28	Concrete Surface Repair
300.500.900.300	Replace Riprap	10 Yrs	0.2	112	22	CY	$120.00	$2,688	$2,868	$198	Replace riprap material periodically
								Total	**$25,540,577**	**$1,763,415**	